PRODUCTION IN THE MODERN ORDER

INDUSTRIAL SOCIETY

PART II

BY

LEON CARROLL MARSHALL

THE UNIVERSITY OF CHICAGO PRESS
CHICAGO, ILLINOIS

Second Impression November 1930

COMPOSED AND PRINTED BY THE UNIVERSITY OF CHICAGO PRESS
CHICAGO, ILLINOIS, U.S.A.

PREFACE

Technically, this is a revised and enlarged edition of *Industrial Society;* really, it is a new publication both by virtue of large amounts of new material and by virtue of great changes in plan and arrangement.

My purpose has been to provide for the introductory course in economics effective readings that will correlate well with the rapidly expanding social study subject matter now presented in our secondary schools; will serve the common needs of the liberal arts student and the student of the collegiate school of business; and will keep the student ever conscious that our economic order is not a separate and distinct entity but rather a special aspect of our general cultural scheme.

It follows from this statement of purpose that the main field of usefulness of the work is that of the junior college and the first two years of the four-year college. It also follows that it could be used—and indeed has been used—as a survey introductory to the field of the social sciences, being of course a survey organized from the economic point of view.

As originally planned the work was thought of as made up of four parts: Part I, "The Emergence of the Modern Order"; Part II, "Production in the Modern Order"; Part III, "The Co-ordination of Specialists"; Part IV, "Social Control of Economic Activity." In view of limitations of space and also in view of the large amount of material that current texts devote to "economic problems," which are largely problems of social control, it was finally decided not to have a separate formal part on social control but to utilize a considerable amount of social control material in connection with the other three parts.

Instructors who wish to shape their instruction according to the plan and arrangement of this material will find helpful a syllabus entitled, *Outlines of the Economic Order* (published by the University of Chicago Press).

In its final form the entire body of the material should prove useful for the more extended elementary courses, the older and briefer

TABLE OF CONTENTS

PART II

PRODUCTION IN THE MODERN ORDER

PRODUCTION IN THE MODERN ORDER

PURPOSES OF PART II

1. To survey the modern economic order from the point of view of production.
2. To see our producing activities as a co-ordinated whole and as an aspect of the entire cultural scheme.
3. To understand the essential factors, essential costs, and essential limitations involved in making available economic goods.
4. To prepare the way for an evaluation of the effectiveness of the existing producing mechanism.

CHAPTER I

THE TYPES AND FORMS OF PRODUCTION

Purposes of this chapter:

1. To get a working classification of producing activities as a tool for thinking.
2. To get a bird's-eye view of the producing system at work.

Economic goods, both physical goods and services, are "scarce," and the outstanding method which man uses to cope with this condition of scarcity is that of producing economic goods. But what does it mean to produce economic goods? The answer may be a varying answer, depending upon the point of view taken.

One answer may be given by classifying the businesses and personal services which one sees being carried on in society. Approaching the problem from this point of view, Professor Carver has formulated the following diagram:

- Modern production: industries and services
  - Primary industries
    - Extractive
      - Hunting
      - Fishing
      - Grazing
      - Lumbering
      - Mining
    - Genetic
      - Agriculture
        - Tillage
        - Plant breeding
        - Animal breeding
      - Forestry
      - Fish culture
  - Secondary industries
    - Manufacturing
    - Transporting
    - Storing
    - Merchandising
  - Personal and professional services
    - Healing
    - Teaching
    - Inspiring
    - Governing
    - Amusing, etc.

Another answer may be given from the point of view of the utilities created or conferred by the various activities mentioned in the foregoing diagram. These utilities are: form utilities, place utilities,

time utilities, possession utilities, and service utilities. The creation of form utilities is well illustrated in the making of a chair, the raising of grain, or the smelting of ore. The essential point is of course the fact that physical matter is changed from one form to another. The creation of place utilities is illustrated by the work of a transportation system. Time utilities are created by the storage of goods; possession utilities, by the processes connected with transfer of the rights of possession and use. A real estate broker is engaged in the creation of possession utilities in our private property society. Service utilities are those which consist in some personal service rendered.

From the foregoing it is clear that to the economist the term production includes any activity that contributes to making available for our use economic goods—both physical goods and services.

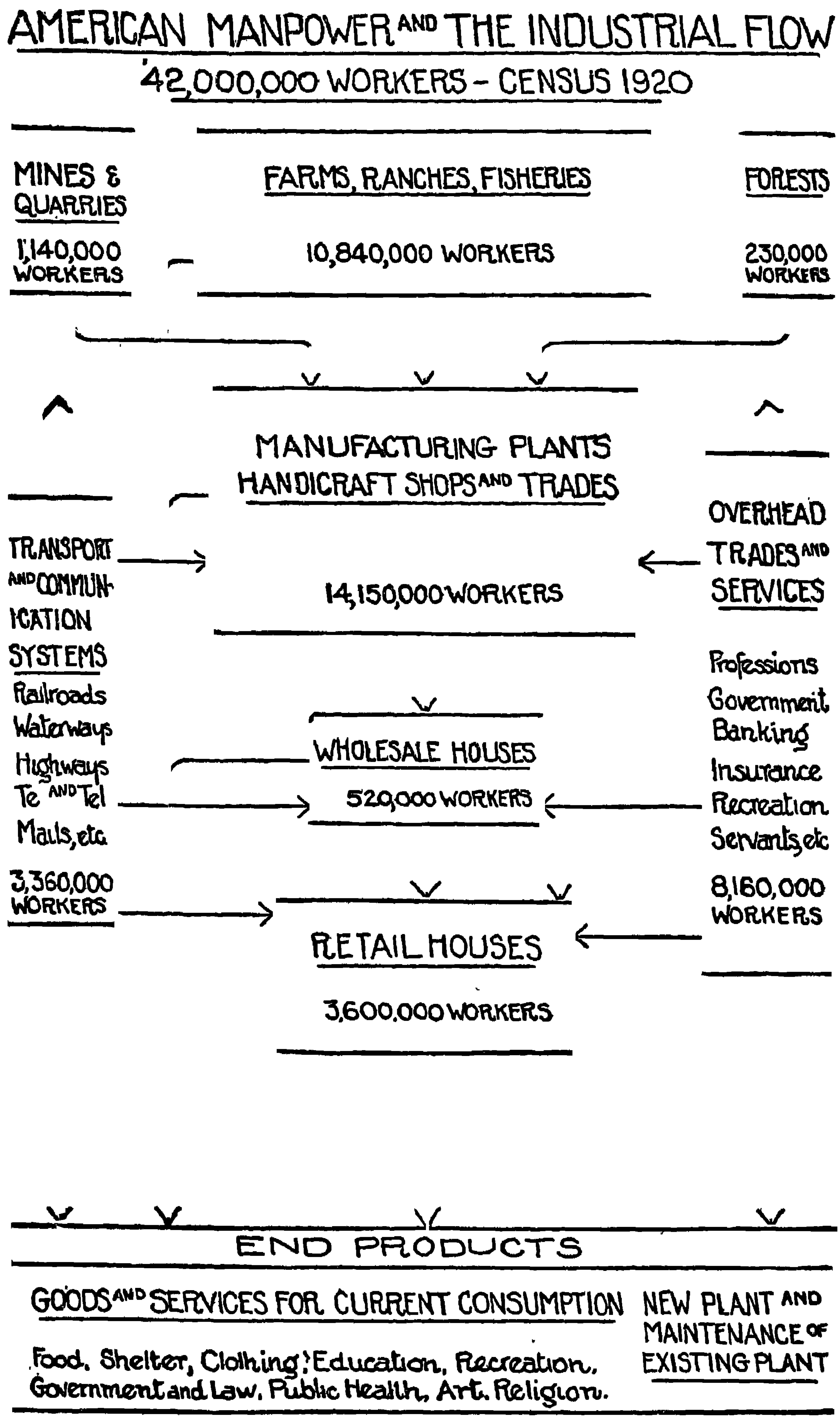
And what are the instruments or agents or factors of production? There is, of course, no one single correct classification of the factors of production. In this case, as always, the classification which one adopts depends upon the purpose he has in mind—upon the use which he expects to make of the classification. The classification that has become orthodox in economic literature speaks of (1) land, (2) labor, (3) capital, and (sometimes) (4) organization or management, but the belief is growing that this classification is not as useful as it was once thought to be. In the chapters which follow we shall deal with (1) nature's contribution or the natural background of production (chap. ii); (2) the cultural background of production as revealed in our non-material culture (chap. iii) and in our material culture (chap. iv); and (3) the personal element in production as manifested in what we call labor (chap. v) and in enterprise and management (chap. vi).

The selections of the present chapter may advantageously be read with the following issues[1] in mind:

1. Descriptively speaking, in what kinds of occupations do we busy ourselves today?
2. What classes of enterprises do we find in our society and what classes of economic goods do they yield?
3. What is the scale of our economic activities today, and to what extent have they become international in character?

[1] A more detailed statement of issues may be found in *Outlines of the Economic Order*, pp. 49–50. (University of Chicago Press.)

1. DIAGRAM OF THE PRODUCING MECHANISM[1a]



[1a] From Chase, *The Tragedy of Waste*, p. 22. By permission of The Macmillan Company, publishers.

2. A CLASSIFICATION OF PRODUCTIVE AND UNPRODUCTIVE ACTIVITIES[2]

I. Productive Industry

1. *Producers of form utility*
   Extractive industries—mining, lumbering, fishing, etc.
   Genetic industries—agriculture, stock-breeding, forestration, etc.
   Manufactures—iron and steel, textiles, automobiles, food products, etc.
2. *Producers of place utility*
   Transportation—railways, canals, ocean transportation, etc.
   Arbitraging—in produce, stocks, bonds, and foreign drafts
3. *Producers of possession utility*
   Merchandizing—wholesale and retail trading
   Banking
   Advertising and salesmanship—of the educative and informative sort
4. *Producers of time utility*
   Storage industries—cold storage, grain elevators, warehousing, etc.
   Speculation
5. *Producers of service utility*
   Professional and personal service—law, ministry, teaching, domestic service, etc.
   Government—police, courts, legislation, administration, etc.
   Insurance

II. Unproductive Activities

1. *Competitive advertising*
2. *Illegitimate speculation*—stock gambling, land speculation, etc.
3. *Predatory activities*—burglary, swindling, adulteration, monopoly, etc.
4. *Aggressive warfare*

See also page 271 for a classification of modern industries and services in terms of (*a*) primary industries, (*b*) secondary industries, and (*c*) professional and personal services. See also page 40 for a diagram of the producing mechanism.

3. CENSUS CLASSIFICATION OF OCCUPATIONS

The following schemes of classification, from the *Index to Occupations*[3] issued by the United States Bureau of the Census, indicate

[2] Reprinted from *Principles of Economics* by R. T. Bye (pp. 84–85) by and with permission of and special arrangement with Alfred A. Knopf, Inc., authorized publishers.

[3] From the *Classified Index to Occupations*, Thirteenth Census of the United States (1910), pp. vi–viii.

the method of classification which was adopted for the Census of 1910.

(A) EXTRACTIVE INDUSTRIES

I. AGRICULTURE, FORESTRY, AND ANIMAL HUSBANDRY

II. EXTRACTION OF MINERALS:

a) *Mining:* coal mines, copper mines, gold and silver mines, iron mines, lead and zinc mines, other mines, mine workers (mine, not specified)

b) *Quarrying:* Quarries (stone, cement, sand, clay, etc.)

c) *Production of salt, oil, and natural gas:* production of salt, production of oil and natural gas

(B) INDUSTRIES OF TRANSFORMATION, TRANSPORTATION, AND TRADE

III. MANUFACTURING AND MECHANICAL INDUSTRIES:

a) *Building trades* (listed as building and hand trades under miscellaneous industries)

b) *Chemicals and allied products:* fertilizer makers; paint makers; powder, cartridge, dynamite, fuse, and fireworks makers; soap makers; other chemical workers

c) *Clay, glass, and stone products:* brickmakers; potteries; tile makers; glass; terra-cotta workers; lime, cement, and gypsum; marble and stone cutters

d) *Clothing:* clothing makers (suits, coats, cloaks, and overalls); clothing makers (other than suits, coats, cloaks, and overalls); corset makers; glove makers; hat makers (wool or felt); shirt, collar, and cuff makers

e) *Food and kindred products:* bakeries; butter and cheese makers; candy; fish curers and packers; flour and grain mills; fruit and vegetable canners, picklers, and preservers; slaughter and packing houses; sugar makers and refiners; other food preparers

f) *Iron and steel and their products:* agricultural implements; automobile factories; car and railroad shops; foundries and metal working; iron and steel mills; ship and boat building; wagons and carriages; other iron and steel workers

g) *Leather and its finished products:* harness and saddle makers and repairers; leather-belt, leather-case, and pocketbook makers; shoes; tanneries; trunk makers

h) *Liquors and beverages:* breweries; distilleries; other liquor and beverage workers

i) *Lumber and its remanufacture:* box makers (wood); furniture; pianos and organs; saw and planing mills; other woodworkers

j) *Metals and metal products except iron and steel:* brass mills; clock factories; copper factories; gold and silver workers; jewelry factories;

lead and zinc factories; tin-plate factories; tinware factories; watch factories; other metal workers

k) *Paper:* box makers (paper); makers of blank books, envelopes, tags, paper bags, etc.; paper mills; pulp mills

l) *Printing and bookbinding:* printing and publishing establishments

m) *Textiles:* carpet mills; cotton mills; dyeing and finishing textiles; hemp and jute mills; knitting mills; lace and embroidery makers; linen mills; print works; rope and cordage factories; sail, awning, and tent makers; silk mills; woolen mills; worsted mills; not specified textile workers

n) *Miscellaneous industries:* broom and brush makers; button makers; charcoal and coke burners; cigars; electric light and power companies; electrical supplies; gas works; oil works; rubber factories; straw workers; tobacco; turpentine distillers; building and hand trades; other miscellaneous industries and occupations; workers in "not specified" manufacturing and mechanical industries

IV. TRANSPORTATION:

a) *Water transportation:* water transportation

b) *Road, street, and bridge transportation:* construction and maintenance of streets, roads, sewers, and bridges; livery stables; truck, transfer, cab, and hack companies; street railways

c) *Transportation by railroad:* transportation by railroad

d) *Express companies:* express companies

e) *Post, telegraph, and telephone:* post; telegraph and telephone

f) *Other persons in transportation:* other persons in transportation

V. TRADE:

Banking and brokerage; insurance; real estate; wholesale and retail trade; elevators; stock yards; warehouses and cold-storage plants; other persons in trade; clerical assistants

(C) SERVICE

VI. PUBLIC SERVICE (NOT ELSEWHERE CLASSIFIED):

a) *Public administration:* federal officials and employees; state officials and employees; county officials and employees; city or town officials and employees

b) *Public defense and maintenance of law and order:*
National defense; army, navy
Maintenance of law and order; United States marshals, county sheriffs, city marshals, constables, detectives, guards in parks, prisons, public institutions, and public buildings, policemen, probation and truant officers, watchmen

VII. PROFESSIONAL SERVICE:

Actors, professional showmen, etc.; artists, sculptors, and teachers of art; clergymen, officials of lodges, religious and charity workers, etc.; legal pro-

fessions; literary professions; medical professions; musicians and teachers of music; scientific professions; teachers, professors in colleges, etc.

VIII. DOMESTIC AND PERSONAL SERVICE:

Occupations not in industries; laundries and laundry work

4. ESTIMATED NATIONAL WEALTH OF THE UNITED STATES

(by Classes of Property, 1900 to 1922)[4]

(Note.—Estimates of national wealth for the earlier censuses were not made by precisely the same methods used more recently and are not closely comparable. Changes in buying power of money, as indicated by levels of prices and wages, materially affect the comparisons.)

(All figures in millions of dollars)

Form of Wealth	1900	1904	1912	1922
Grand total	88,517	107,104	186,300‡	320,804
Real estate, plant, and equipment total	69,848	83,801	141,700	229,406
Real property taxed	46,325	55,510	96,923‡	155,909
Real property exempt	6,213	6,831	12,314	20,506
Livestock	3,306	4,074	6,238	5,807
Farm implements and machinery	750	845	1,368	2,605
Gold and silver coin and bullion	1,677	1,999	2,617	4,278
Manufacturing machinery, tools, etc.	2,541	3,298	6,091	15,783
Railroads and their equipment	9,036	11,245	16,149	19,951
Motor vehicles	....	....	....	4,567
Transportation and transmission enterprises (except railroads) total	3,495	4,841	10,265	15,414
Street railways	1,576	2,220	4,597	4,878
Telegraph systems	212	227	223	204
Telephone systems	400	586	1,081	1,746
Pullman and other private cars not owned by railroads	99	123	123	545
Pipe lines	....	....	....	500
Shipping and canals	538	846	1,491*	2,951†
Irrigation enterprises	....	....	361	....
Privately owned waterworks	268	275	290	361
Privately owned central electric light and power stations	403	563	2,099	4,229
All other, total	15,174	18,462	34,334	75,984
Agricultural products	1,455	1,899	5,240	5,466
Manufactured products	6,087	7,409	14,694	28,423
Imported merchandise	425	496	827	1,549
Mining products	327	408	816	730
Clothing and personal ornaments	2,000	2,500	4,295	39,816
Furniture, carriages, etc.	4,880	5,750	8,463	

* Includes $402,000,000 value of ships belonging to the United States navy.

† Includes $1,446,000,000 value of ships belonging to the United States navy.

‡ Differs from estimate as published in 1912 because of revision of estimate for taxed real property in Oklahoma.

[4] Adapted from *Statistical Abstract of the United States, 1928*, p. 287. (Washington, D.C.: Government Printing Office.)

5. A VIEW OF SOME OF OUR LEADING INDUSTRIES

A. SIXTEEN GROUPS OF MANUFACTURING INDUSTRIES, 1925[5]

Industry	Number of Establishments	Wage Earners (Average Number)	Wages	Cost of Materials	Value of Products	Value Added by Manufacture	Primary Horse-Power
			Expressed in Thousands of Dollars				
All industries: 1925	187,390	8,384,261	10,729,969	35,935,648	62,713,714	26,778,066	35,772,628
1914	271,822	7,015,136	4,063,210	14,242,415	24,065,766	9,823,351	22,264,343
1. Food and kindred products	48,113	664,760	793,681	7,748,678	10,418,536	2,669,858	3,881,952
2. Textiles and their products	24,433	1,627,141	1,654,013	5,348,050	9,122,858	3,774,808	3,986,136
3. Iron and steel and their products, not including machinery	6,068	851,270	1,284,339	3,734,350	6,461,668	2,727,318	7,518,999
4 Lumber and allied products	21,922	921,145	978,375	1,724,983	3,688,552	1,963,569	3,472,770
5. Leather and its finished products	4,264	315,288	356,246	1,015,123	1,767,581	752,458	413,759
6. Rubber products	498	141,121	190,563	718,840	1,255,414	536,574	656,857
7. Paper, printing, and related industries	26,553	536,766	805,516	1,614,235	4,143,685	2,529,450	3,060,794
8. Chemicals and allied products	8,871	381,075	506,386	4,184,911	6,438,027	2,253,116	2,984,913
9. Stone, clay, and glass products	8,478	353,036	467,012	603,427	1,640,652	1,037,225	2,348,157
10. Metals and metal products, other than iron and steel	6,924	275,292	380,781	1,946,777	2,833,770	886,993	1,158,486
11. Tobacco manufactures	2,623	132,132	111,558	425,769	1,091,001	665,232	42,075
12. Machinery not including transportation equipment	11,807	858,843	1,225,359	1,985,367	5,020,281	3,034,914	2,714,377
3. Musical instruments and phonographs	461	46,980	62,502	98,761	231,687	132,926	97,318
14. Transportation equipment, air, land, and water	2,778	559,578	908,488	3,389,101	5,451,753	2,062,652	1,888,961
15. Railroad repair shops	2,363	457,755	668,192	563,646	1,332,679	769,033	942,248
16. Miscellaneous industries	11,234	262,079	336,958	833,630	1,815,570	981,940	604,826

[5] Adapted from *Statistical Abstract of the United States, 1928,* pp. 752–53. (Washington D.C.: Government Printing Office.)

B. ESTIMATED VALUE OF FARM PRODUCTS OF THE UNITED STATES, 1926[6]

Products	1926 Value $000,000	1926 Percentage of total
Total crops	9,266	100.0
Cereals	3,687	39.8
Cotton	1,294	14.0
Flax, fiber and seed	39	0.4
Fruits	666	7.2
Hay and forage	1,490	16.1
Legume seeds	124	1.3
Other seeds, grass, etc.	35	0.4
Sugar crops	119	1.3
Tobacco	245	2.6
Vegetables	1,117	12.1
Farm-forest products	318	3.4
Other crops	132	1.4
Total animal products	7,300	100.0
Animals raised	3,065	42.0
Bee products	12	0.2
Dairy products	2,952	40.3
Poultry products	1,181	16.2
Wool	85	1.2
Other animal products	5	0.1
Deduct crop fed to livestock	3,581	
Net total, all products	12,985	

[6] Adapted from *Statistical Abstract of the United States, 1928,* p. 605. (Washington, D.C.: Government Printing Office.)

C. VALUE OF MINERAL PRODUCTS OF THE UNITED STATES[7]

(Note.—All figures in millions of dollars.)

Yearly average or year	Total	Metallic	Non-Metallic	Un-speci-fied	Year	Total	Metallic	Non-Metallic	Un-speci-fied
1881–1885...	426	191	229	6	1910....	1,988	750	1,238	*
1886–1890...	541	248	292	1	1911....	1,924	681	1,243	*
1891–1895...	592	244	347	1	1912....	2,238	862	1,375	*
1896–1900...	828	366	461	1	1913....	2,434	879	1,554	*
1901–1905...	1,392	578	813	1	1914....	2,111	687	1,424	*
1906–1910...	1,887	769	1,118	*	1915....	2,395	992	1,400	2
1911–1915...	2,220	820	1,399	1	1916....	3,508	1,621	1,884	3
1916–1920...	5,124	1,796	3,322	5	1917....	4,992	2,086	2,900	6
1921–1925...	5,155	1,153	3,998	5	1918....	5,541	2,153	3,381	7
1901........	1,155	493	661	1	1919....	4,596	1,360	3,233	3
1902	1,329	605	722	1	1920....	6,981	1,762	5,214	5
1903........	1,495	589	906	1	1921....	4,139	654	3,482	3
1904........	1,359	501	858	*	1922....	4,647	987	3,656	4
1905........	1,624	703	921	*	1923....	5,987	1,511	4,472	4
1906........	1,901	886	1,015	*	1924....	5,306	1,232	4,068	6
1907........	2,070	904	1,165	*	1925....	5,678	1,380	4,291	6
1908...... ..	1,592	551	1,041	*	1926....	6,213	1,403	4,802	8
1909........	1,887	755	1,132	*	1927....	5,520	1,217	4,294	9

* Less than $500,000.

6. INTERNATIONAL RELATIONSHIPS IN MANUFACTURE[8]

There are five international relationships which may exist among the various activities of combinations which operate both in the United States and in other countries. These are as follows:

1. Manufacture in foreign countries for distribution in the United States.

2. Manufacture in the United States for distribution in foreign countries.

3. Manufacture in foreign countries from raw materials produced in the United States.

4. Manufacture in the United States from raw materials produced in foreign countries.

5. Parallel manufacture in United States and foreign countries.

The concerns which manufacture commodities in the United

[7] Adapted from *Statistical Abstract of the United States, 1928*, p. 705. (Washington, D.C.: Government Printing Office.)

[8] Adapted from Willard L. Thorp, *The Integration of Industrial Operation*, Census Monograph III, pp. 118–22. (Washington, D.C.: Government Printing Office, 1924.)

States and also are active in the production of their raw materials in other countries deserve special mention. Some indication of this type of industrial activity can be obtained from the following examples:

The Hershey Chocolate Co., manufacturers of chocolate, cocoa, and chewing gum, confine their manufacturing activities in this country to Hershey, Pa. In order to obtain the raw materials used, this company has expanded into Cuba, where it operates two sugar mills, 69 square miles of sugar plantations, and the railroads necessary for efficient production.

The International Harvester Co. operates, in Matanzas Province, Cuba, 3,000 acres of fiber plantations, the products of which are used in the company's twine mills in this country.

The United States Rubber Co., through its subsidiary company, the United States Rubber Plantation (Inc.), is said to own 93,000 acres of land in Sumatra, of which 44,227 acres have been cleared and planted with over 5,000,000 rubber trees.

The Anaconda Copper Co. has undertaken extensive operations in Brazil.

A somewhat different development is found in the case of companies operating in the United States and Mexico. The industries here concerned are those of metal mining and of petroleum refining. The Standard Oil Co. of New Jersey, through the Transcont de Petroleo S. A., Mexico, carries on extensive operations in Mexico, although most of its refining is done in the United States.

Another industry is represented in the activities of manufacturers in both Canada and the United States. The International Paper Co., for instance, operates plants in Maine, New Hampshire, Vermont, Massachusetts, and New York, while the greater part of the woodland which it controls is in Canada.

The instances cited above demonstrate at least the existence of activity on the part of American manufacturers in the production of raw materials abroad for use in their American factories. That foreign manufacturers procure much of their material from the United States is also doubtless true, especially commodities such as raw cotton and foodstuffs.

Concerning the operators who are manufacturing similar products in the United States and other countries, no definite information is

available. Here, again, it is necessary to fall back upon single instances as indicative of the possibilities along these lines.

The largest group includes the international transportation companies. Of these the railroads which afford communication between Canada and the United States are perhaps the most important, since little oceanic transportation is done by American enterprises. Necessarily these railroads operate repair shops both in Canada and in the United States, which are classed by the Census Bureau as manufacturing establishments.

Practically all the companies which have been mentioned as falling in the other categories also manufacture similar productions in the United States and foreign countries. The Singer Manufacturing Co. operates plants outside the United States in St. Johns, Quebec; Kilbowie, near Glasgow, Scotland; Wittenberg, Prussia; and Podolsk, Russia. The Standard Oil Co. of New Jersey, in addition to operating distributing companies (which in many cases includes the operation of tank steamers) in Holland, France, Mexico, Denmark, Germany, Canada, Rumania, and Italy, operates manufacturing companies in Mexico and Rumania and two small refineries in France. The B. F. Goodrich Co. operates a factory in Colombes (Seine), France, and the United States Rubber Co. operates manufacturing establishments in Canada. The International Harvester Co. shows a broad development, controlling companies which own plants and conduct business in the United States, Canada, France, Germany, Russia, and Sweden, and distributing companies in Denmark, Norway, Switzerland, Belgium, Austria, New Zealand, Australia, Great Britain, and the Philippine Islands.

The Ford Motor Co., through affiliated companies, is producing Ford cars in foreign countries. The Ford Motor Co. of Canada (Ltd.), manufacturers at Ford, Ontario; the Ford Motor Co. (England) (Ltd.), has its factory at Manchester; and the Ford Motor Co., Paris, France, has a branch at Bordeaux. There are also assembling and branch plants at Copenhagen, Denmark; Cadiz, Spain; Buenos Aires, Argentina; and Sao Paulo, Brazil.

The American Radiator Co. is another example of such international expansion, with plants and branches at Toronto and Brantford, Ontario; London and Hull, England; Paris and Dole, France; Milan

and Brescia, Italy; Brussels; Berlin, Schoenebeck, and Neuss, Germany; and Vienna and Wiener Neustadt, Austria.

The various international tobacco companies should also be noted. The Tobacco Products Corp. is a combination of various companies having factories and depots in the United States, Canada, Cairo, Smyrna, Athens, Cavalla, Samsoun, and Shanghai. The British-American Tobacco Co. (Ltd.), owns all or a majority of the stock in companies located in Denmark, Belgium, China, India, Ceylon, Egypt, South Africa, Jamaica, Canada, and the United States.

One other development must be mentioned, namely, the growth of international publishing houses. Examples of this kind are the Macmillan Co., which publishes in the United States, Canada, and England; and R. P. Putnam's Sons, Funk & Wagnalls Co., and D. Appleton & Co., publishing in the United States and Great Britain.

These instances should be sufficient to demonstrate the fact that American industry is expanding into foreign countries. It is interesting to note that in most of the cases cited the product is one which has been developed in this country and has then been taken abroad by the company which originally developed it. It is possible that economic enterprises will feel the restraints of national boundaries to a smaller and smaller degree, with the development of rapid communication and of world markets.

See also "Concentration in the International Field," page 877.

7. A CLASSIFICATION OF PRODUCTION ELEMENTS[9]

It will be apparent that in most production processes four elements are needed: the subject element, the thing worked upon; the active agent, the worker; the tools or machines and the like worked with; and the supplies used up. The following classification is based upon a more detailed consideration of the way in which these elements behave in the processes of production:

Man—Human effort.

Land and land betterments.

[9] J. D. Black, *Introduction to Production Economics*, pp. 56–58. (Henry Holt & Co., 1926.)

Land reconstructions—roads, bridges, tunnels, canals, ditches.
Land fixtures—railroads, fences, telegraph lines.
Buildings.
Raw materials—ore, natural timber, fish, game, water, etc.
Goods-in-process.
Supplies—fuel, feed, seeds, oil, paint, paper, twine, etc.
Equipment—tools, machines, street cars, etc.
Work stock—horses, mules, etc.
Breeding stock.
Growing stock.
"Productive" live stock—dairy cows, sheep, etc.
Growing crops.
Organization and goodwill.
Money.

Both buildings and equipment depreciate from their first use, but buildings have a fixed location whereas equipment is movable. Land "reconstructions" such as ditches, tunnels, bridges and roads, depreciate and have fixed location exactly like buildings. Land fixtures behave even more like buildings. Certain other changes to land, however, such as additions of fertilizer, removing stumps or stones, leveling, once they have been incorporated in the land, behave exactly like land itself. There is no significant difference between the behavior of a naturally level stretch of land and one which has been made level artificially; or between natural soil humus and that which has been put there by the use of manures. Land, it will appear presently, although it depreciates with use, does not in ordinary experience ever depreciate to the point where it cannot be restored again to former productivity; and land betterments behave as if they were the land itself—in fact, they are the land itself.

Raw materials appreciate with the first step in production and become goods-in-process, which in turn appreciate and pass into other and more advanced stages of goods-in-process, till they finally become final goods-in-hand for consumption. Appreciation is taking place all the way, although in the case of perishable fruits, for example, accompanied by a depreciation that may more than offset the appreciation. Supplies, on the other hand, are used up in the process of production, either losing their original form completely, as in the case of fuel, or

losing it sufficiently so as not to be suitable for further use, as in the case of paper or twine.

Growing live stock behaves in most respects like goods-in-process; but work stock, breeding stock and "productive" live stock behave like equipment—each act of production uses up some portion of them. All live stock, however, depreciates in an unusual way. In the first place, the organism recuperates almost completely after each act of production, so that the residue of actual final depreciation is always very small; and in the second place, until somewhere near the prime of life is reached, this residue is more than offset by other compensating growth processes, so that it is commonly said that live stock appreciates at first and then depreciates. This statement is actually true, although it must be recognized that the appreciation is after all only a *net appreciation,* the result of a gain of one kind that more than offsets a loss of another kind. The expression "productive live stock" has come into use to describe live stock that yields a product, like milk, wool or eggs. The term is not a good one, however, and continues in use only for the want of a better.

Growing crops is still another form of goods-in-process, very much like growing live stock in most respects.

Money is put in a separate classification because mobility is its very essence. It is like equipment in its method of depreciation, that is, it starts in as new money and wears out from use.

Organization and goodwill are most peculiar of all in their behavior in the production process. Both are very irregular in their manner of appreciating and depreciation.

The behavior of human beings in production is much like that of work stock in one respect, namely, in the manner of appreciating and depreciating. The essential difference between man and all other agents of production are his power to control his own behavior and his ability to determine his own productive powers.

In textbooks in economics, it is customary to group the foregoing list of production elements into three classes. Labor, or Human Effort, is made one classification, Land another, and all the rest are called Capital Goods. Land betterments and land reconstructions are usually classified with Capital Goods because they are products of past effort. Some writers do not attempt to separate Land and Capital

Goods. Obviously such a classification is not of very much value for the purpose of a production economics analysis.

See also "Labor and Natural Objects as Productive Factors," page 297.

8. PRODUCTION ILLUSTRATED BY A COMMODITY[10]

A large part of the world's cotton is grown in the southern part of our own country. This cotton-growing takes place over an enormous territory, and it is performed by some two million growers, who cultivate farms ranging in size from a few acres to great plantations of more than a thousand acres. The product is grown under varying conditions, and of course it varies in quality. It must be brought together, sorted, graded, and sent to mills in Europe, New England, the Middle States, and the South. These mills buy in large quantities, and they must have cotton of a uniform, usable quality. All this constitutes a complex problem.

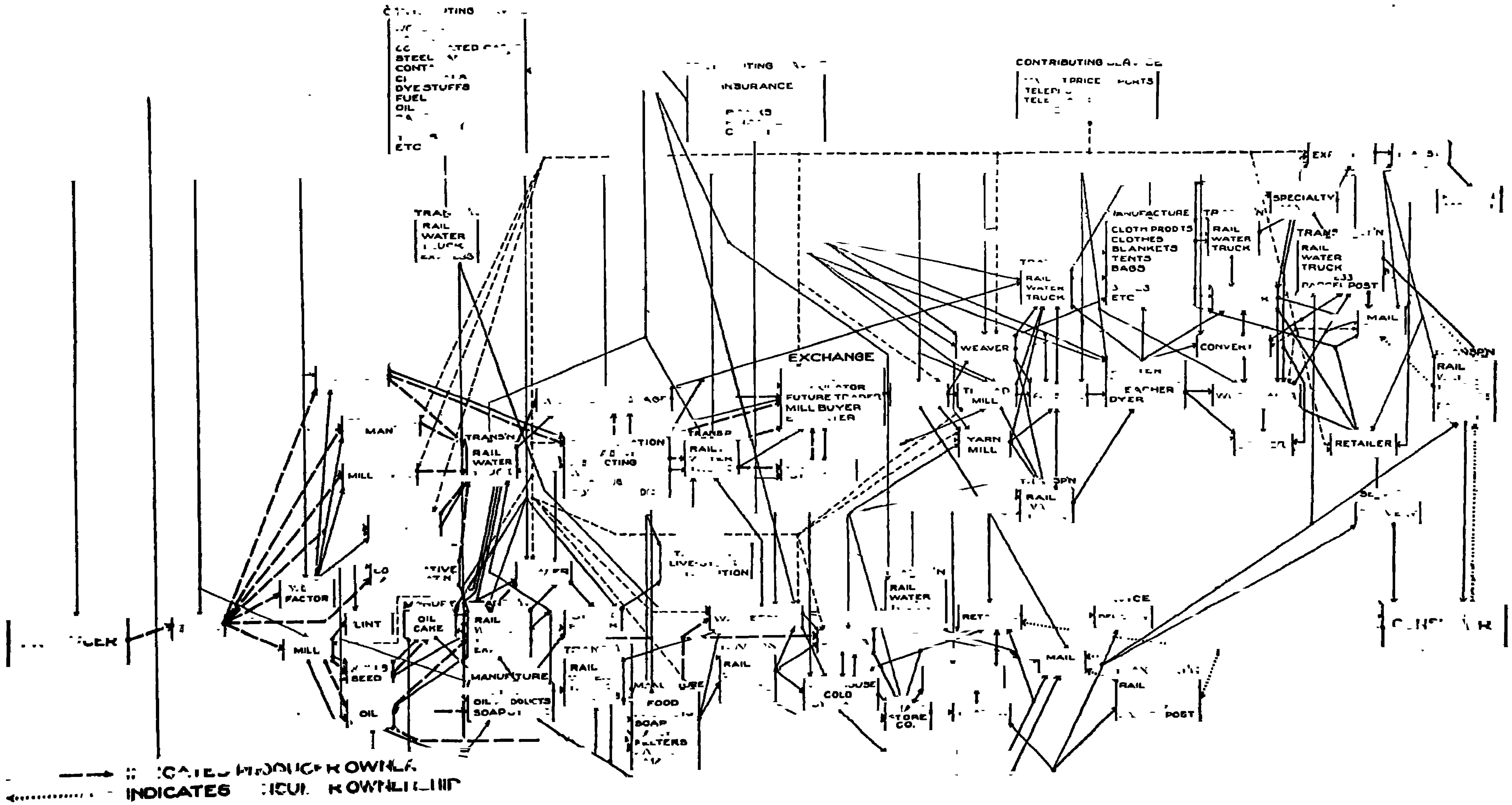
The specialized handling of the cotton seeds.—When the cotton-grower hauls his cotton to the gin, the product is split into two parts—the seeds and the fibers. Let us first follow the seeds through to the consumer. As is hinted in the diagram, the gin leaves a little lint on the seeds. Out of this lint, the hulls, and the meats, our modern technological industry makes a great range of products. The lower part of the chart shows these products emerging at various stages of manufacture; being transported to various places and various persons; being placed in storage; and getting into the hands of jobbers and retailers who finally get them (in one form or another) into the hands of consumers. As is shown by the material at the top of the chart, ranges of contributing services play their part in various stages of the process. The men who perform these services are called "specialist interveners" or "functional middlemen." Truly, a very complex series of operations takes place between the producers and the consumers.

The specialized handling of the cotton fiber.—To go back to the ginnery: The cotton fiber that is pulled off by the little circular saws

[10] Adapted from Marshall and Wiese, *Modern Business*, pp. 227–32. Reprinted by permission of The Macmillan Company, publishers.

DISTRIBUTION OF COTTON AND COTTON PRODUCTS

JOINT COMMISSION OF AGRICULTURAL INQUIRY



of the gin is carried by suction through large pipes to the "press box." Here a mechanical tamper presses the fiber into huge bales of about five hundred pounds each. These are covered with rough bagging and bound with wire bands. The cotton is now for sale. As the chart indicates, this cotton moves on through the market in various channels. The ginner himself may buy it; some country merchant who has been making advances of goods to the grower may take charge of it; "street buyers," working either for themselves or for some big cotton-buyer from New Orleans, Galveston, or Savannah, may buy the cotton from the planter, the ginner, or the country merchant. The grower may hold it for a while or may send it to a commission man at some large market.

Through one agency or another, the cotton begins to pass along various transportation channels to points that are known as concentration points. At these points the big, clumsy bales of the ginnery are put through a compress and packed into smaller and tighter bales, unless that has already been done somewhere else along the way. Here also the cotton is likely to be weighed and inspected and, in particular, it is likely to be graded. This means merely that each bale is judged and that the quality of cotton in it is given a standard name, such as "good middling" or "middling" or "low middling." The grades have been established by our federal government after a very careful study, and agents of the government do the inspecting and assigning of grades. They take samples of cotton from the bales, examine these samples, carefully compare them with samples which the United States Department of Agriculture has furnished, and assign a grade.

The bales are now ready to move either to storage warehouses or to mills in various parts of the world. Most of the further buying and selling of these bales takes place in what is known as the cotton exchanges. These are located at cities such as New Orleans and New York where buying and selling take place. The sellers do not bring the bales to the exchange. All the selling is done either "by samples" taken from the bales or "by description," which means merely that it is sold as being of a certain grade. Anyone who has cotton to sell may offer it for sale in these market places. Anyone who wishes to buy cotton may buy it there. If, however, he is not a member of the exchange,

he must secure the services of someone who is a member in order to carry on these transactions. Buyers and sellers from all over the world buy and sell cotton in these market places through their agents and brokers. The cotton is not owned by the exchange. The exchange is an association of brokers; it is merely a market place in which its members buy and sell. No one needs to use the brokers of these exchanges unless he wishes to do so, but as a matter of fact most of the large transactions in cotton occur on these exchanges.

Such exchanges are convenient not only because they are rooms in which buyers and sellers of cotton can meet; they are also places where financial arrangements, insurance arrangements, and shipping arrangements can be made. Among the members of a cotton exchange will be found commission merchants who sell cotton for planters; exporters who buy cotton for spinners and merchants in Europe; merchants who buy cotton for spinners in the United States; bankers who provide funds for the handling of the cotton; ship agents who represent the vessels by which the cotton is carried abroad and to domestic ports; insurance agents who insure the cotton during its shipment; cotton brokers who bring buyers and sellers together; and future brokers, who buy and sell for delivery in the future.[11] A person dealing in cotton can accordingly find on one floor all the specialists with whom he needs to work.

These exchanges are great information-gatherers concerning facts of importance in the pricing of cotton. Information from all over the world concerning the demand for cotton and the supply of cotton is collected and sent by wire or letter to them. Reports come in continually on the conditions of crops in this and other countries; on existing supplies of cotton; on weather conditions that might affect growing crops; on wars and rumors of wars; in brief, on all possible matters that might affect the demand for cotton or the supply of cotton. The brokers who deal on the exchanges become very expert in judging the effect of these varying conditions upon the price of cotton. The price at which cotton sells at these central markets is telegraphed all over the world. Cotton, even in remote country districts, is bought and sold on the basis of the prices at the exchanges.

The rest of the diagram on page 287 is self-explanatory. The cot-

[11] *Report of the Industrial Commission*, Vol. XI (1901), p. 27.

ton which has been bought and sold on the exchanges moves through various transportation facilities to foreign markets or to mills in our own country and there goes through various types of manufacturing. Brokers, wholesalers, mail-order houses, retailers, play their part, and the goods finally reach the consumer. As was true of the handling of the cotton-seed products, ranges of specialist interveners or functional middlemen give their assistance at various stages of the process. The result of it all is that producers and consumers are knitted together.

See also "Diagram of the Producing Mechanism," page 273.

CHAPTER II

THE NATURAL BACKGROUND OF PRODUCTION

Purposes of this chapter:

1. To get a glimpse of the significance of natural resources in the production of economic goods and services.
2. To see the outstanding problems involved in the effective use of natural resources.

It is a commonplace that without the aid of nature's powers, man can do nothing—and indeed would not exist.

In the earliest stage of his culture, man was a mere collector or appropriator, taking with his bare hands such of nature's yield as she unaided—and unsubjugated—chose to grant him. As we look back at that early stage, it is abundantly plain that in few cases does nature unaided yield goods in the form desired. As time went on, man became increasingly able to take substances furnished by nature and to work them over to his uses as hunting tools, as shelter devices, as clothing, and as not a few other goods. He became an adapter. Fairly recently as human affairs go, man has added to his appropriative and adaptive propensities a quality that may properly be called creative; he now creates substances not found in nature (for example, glass, cement, steel), and he finds that this creative power adds not a little to his ability to live well.

In some real sense all that man does or can do in production is to command—to harness—natural forces and resources. This chapter, accordingly, may well deal with two major issues: What is the rôle played by earth features and earth resources in production? What are the characteristic problems in the effective use of natural resources?

A. Earth Features and Earth Resources Condition Man's Activities

Man's whole life is conditioned by an interaction between man and his natural environment. In the more primitive stages of culture, nature very patently determines the character of man's activities. The character of his housing (witness the Eskimo hut), the devices and

forms of transportation (witness the modes of travel of the Iroquois), the character and abundance of his food supply, the forms of his religion even—and this is the merest beginning of a long list—are visibly and profoundly influenced by his natural environment. In the higher stages of culture we say that man has conquered nature; that he is more "free" from the grip of nature. There is no harm in putting the matter thus, provided we realize that what has really happened is this: man has become more free from the thralls of a *single local* environment; as for the rest, he still depends upon the powers of nature and his activities are still conditioned by those powers. He has, however, become a more active agent in the partnership with nature, and the interactions of the two are now on a different plane.

On every plane of this interaction, the influence of the natural environment is not only persistent and abiding but also powerful. Climate, soil, minerals, topography, flora, fauna, natural forces, and powers—these are relatively unchanging and they set the stage for man's cultural development. They are reflected somewhat in his physical being and also in his speech, his religion, his literature, in all his social and economic institutions.

The following selections point the way to the answer of such issues[1] as these:

1. Precisely what materials, powers, forces, etc., are included in the expression, "earth features and earth resources"?
2. In what types of ways do these earth features and earth resources condition our economic activities?
3. Does the physical environment determine culture?
4. In what fields or types of activity has man achieved outstanding control of nature?
5. What are the main uses which are made of "land" in production?

1. THE PLACE OF NATURAL AGENTS IN PRODUCTION

A. THE DEBT OF MAN TO NATURE[1a]

In this inquiry the earth as modifying human life includes the land surface down to the bottom of the deepest possible mine or artesian

[1] A more detailed statement of issues may be found in *Outlines of the Economic Order*, pp. 53–55. (University of Chicago Press.)

[1a] Adapted from Otis T. Mason, "Technogeography, or the Relation of the Earth to the Industries of Mankind," in the *American Anthropologist*, VII (1894), 138–58.

well or geological stratum; all the aqueous mass—that is, every drop of water in the seas and out of them, for there is no telling when any drop may enter the circle of human agencies and ownerships; the circumambient air, every gallon of that aerial ocean which swathes the world and vitalizes all living things, the common carrier of clouds and birds, of health and disease, of music and perfumes, of industry and commerce. As modifying human conduct, as subject of pre-emption and monopoly, not only the masses just mentioned are included, but motions and powers, even gravity, mechanical properties, physical forces, chemical activities, vital phenomena of plants and animals, that may be covered by patents and their uses become a matter of legislation and diplomacy.

The earth is the mother of all mankind. Out of her came they. Her traits, attributes, characteristics they have so thoroughly inherited and imbibed that, from any doctrinal point of view regarding the origin of the species, the earth may be said to have been created for men and men to have been created out of the earth. By her nurture and tuition they grow up and flourish, and folded in her bosom they sleep the sleep of death.

The earth is also a great warehouse of materials of infinite qualifications for gratifying human desires. This is apparent enough to anyone who reflects about it, but few persons think of the long ages during which these substances were being compounded and compacted. These materials are the foundation of all technique and all styles of technique—textile, plastic, graphic, glyphic, tonic, and landscape. For them the earth not only furnishes the raw stuffs, but the apparatus and different motives to different races.

The earth is also the reservoir of all locomotion and power useful to man. Even the strength of his own limbs and back is derived from the food which she bestows. I do not speak of that, however, but of the substitutes therefor. She gives to the North American Indians the dog, to the South American the llama, to the people of the eastern continent the horse, ass, camel, elephant, and ox to convey them about and to carry or draw their loads.

The winds blow upon the sails and turn the mills, the waters set in motion the wheels and transport the freight. The steam is a still more versatile genius of power, and electricity just enters upon its

mission. Coal, as a cheap source of energy, enables men to substitute for areas of raw material areas of manufacture and, indeed, to create areas of consumption.

It would occupy too much space were I to elaborate in the most elementary manner the methods in which domestic animals, wind, fire, water, elasticity of solids, elasticity of gases, explosives, chemical action, magnetism, and electricity had enrolled themselves in the serv-

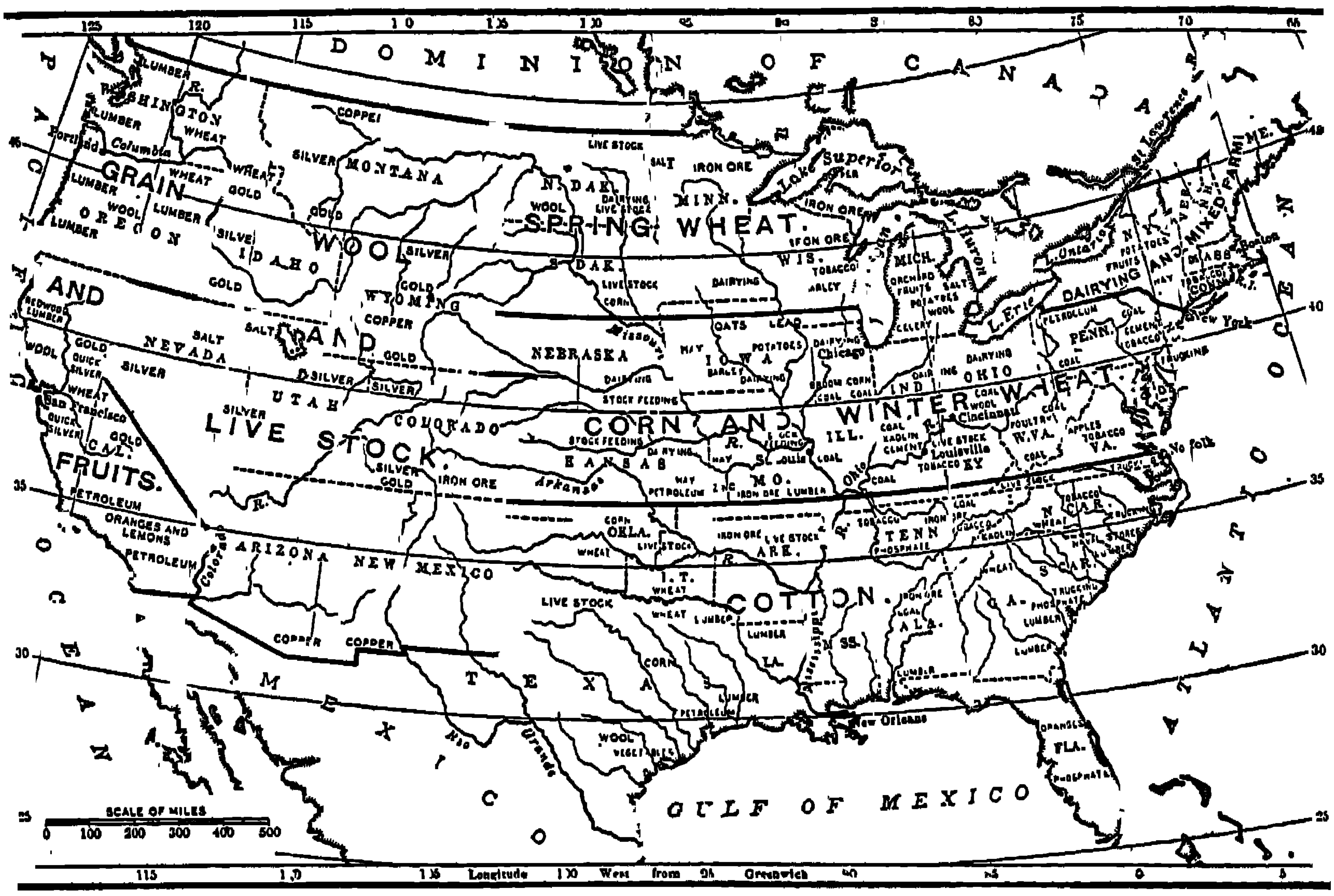
NAVIGABLE WATERWAYS

The heavy lines show the navigable waterways of the United States, in which the water is 3 feet deep or over. The length of these is some 18,000 miles.

ice of mankind merely to furnish power to do the work that in the simplest form is done by hand.

The form of the globe, its coast lines, elevations and reliefs, the amount of sunshine, the properties and contents of the atmosphere, the varying temperatures, winds, rainfalls, and springs beneath the surface, the waterfalls in the surface also act as motives, if not as motive power to all apparatus and all the movements of men. We cannot eliminate the heavenly bodies from this enumeration, since they furnished clocks and almanacs and compasses to primitive peoples, and longer voyages were undertaken by their guidance in the Pacific than were made two centuries later in the Atlantic by Columbus with the aid of the mariner's compass.

Exploitation and cultivation, manufacture, transportation, exchange, consumption, together constitute the round through which commodities are conducted in the progress of industries. The earth was in the beginning and is now the teacher of these activities. There were quarriers, miners, lumberers, gleaners, and, some say, planters; there were fishermen, fowlers, trappers, and hunters before there was a *genus homo*. There were also manufacturers in clay, in textiles, and

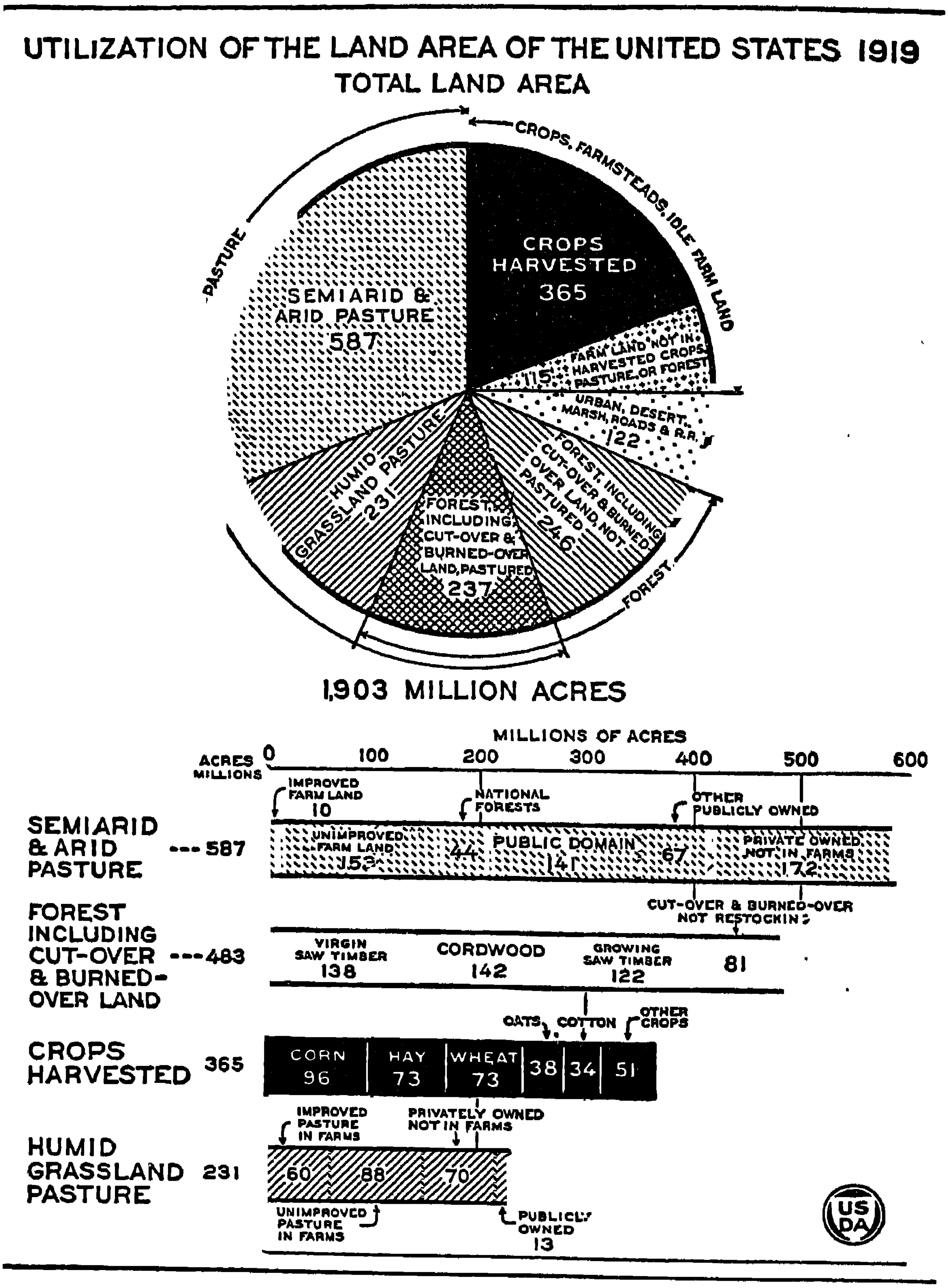


Regional Distribution of Products in the United States

in animal substances before there were potters, weavers, and furriers; there were all sorts of moving material and carrying passengers and engineering of the simplest sort. It might be presumption to hint that there existed a sort of barter, but the exchange of care and food for the honeyed secretion of the body going on between the ants and the aphidae look very much like it.

In all this, the race has grown, not independent of the earth, but more dependent upon it. Artificial and domesticated supplies of material are as much from the earth as the wildest. Men in devising tools and machinery and engines to do the work of their hands have had to go to their mother for them. They use other forces than their own, but they are still forces furnished by the earth. They have multiplied in-

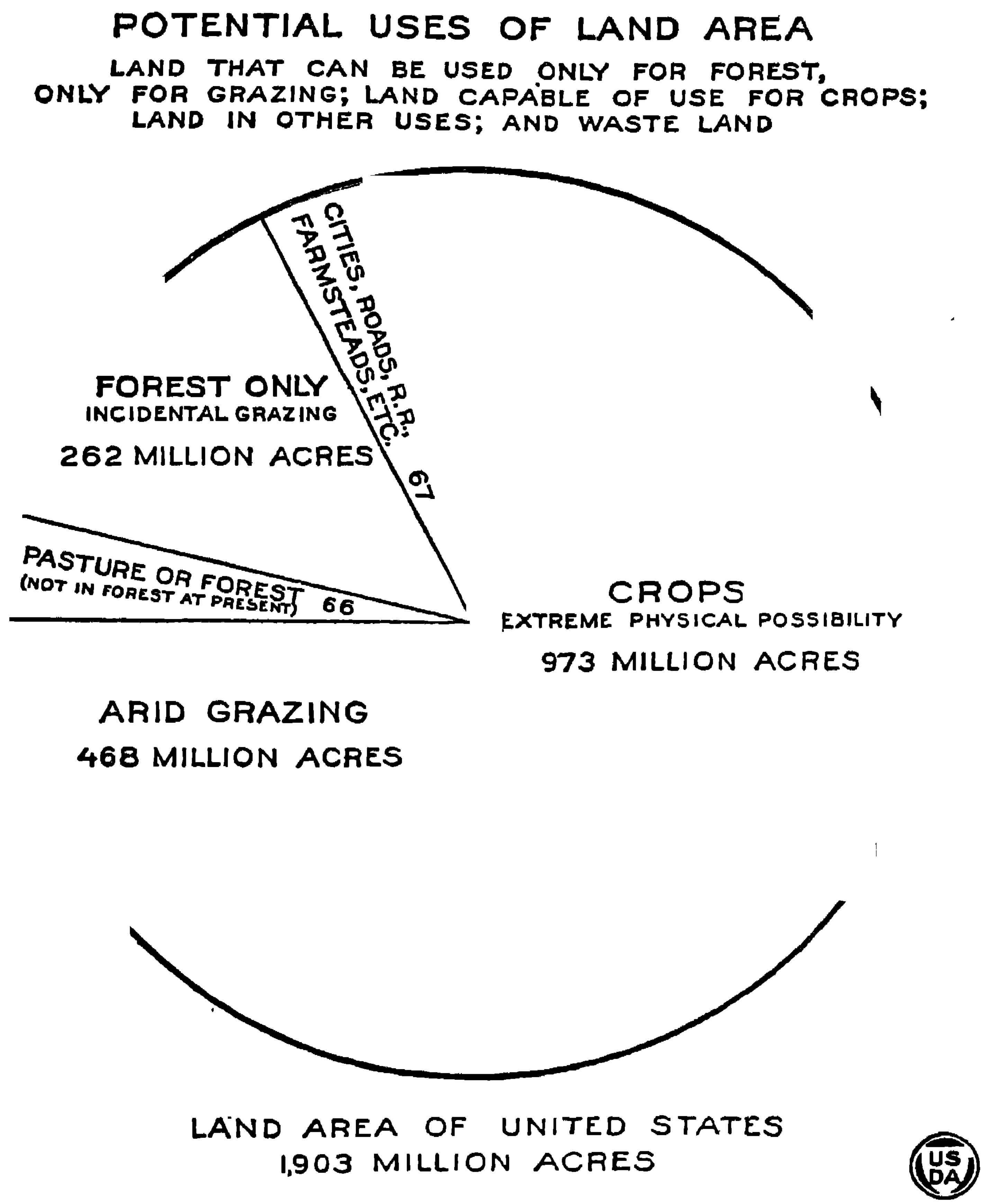
vention upon invention, but every one of them is a device for using a great loan already in hand for the purpose of raising a larger one.



Utilization of Land Area of the United States, 1919

In this partnership between man and the earth the progress of culture has been from naturalism to artificialism; from exploitation to cultivation and domestication; from mere muscular power to more subtle physical force of man, of beast, of water, of air, of fire, of elec-

tricity; from tools to machinery; from simplest imitative processes to highly complex processes, involving many materials and motive pow-



Potential Uses of Land Areas of the United States

ers and inventions; from short journeys to long journeys; from mere barter to world-embracing commerce; from monotonous and monorganic food and clothing, shelter and furniture, mental and social appliances to forms as complex and varied as the imagination can conceive. And when the supply gives out, it is not the earth that fails, but it is the comprehension and the skill of men.

B. LABOR AND NATURAL OBJECTS AS PRODUCTIVE FACTORS[2]

The requisites of production are two: labour, and appropriate natural objects. Labour is either bodily or mental; or, to express the distinction more comprehensively, either muscular or nervous. Of the other requisite—appropriate natural objects—it is to be remarked, that some objects exist or grow up spontaneously, of a kind suited to the supply of human wants. There are caves and hollow trees capable of affording shelter; fruit, roots, wild honey, and other natural products, on which human life can be supported; but even here a considerable quantity of labour is generally required, not for the purpose of creating, but of finding and appropriating them.

Nature, however, does more than supply materials; she also supplies powers. The matter of the globe is not an inert recipient of forms and properties impressed by human hands; it has active energies by which it cooperates with, and may even be used as a substitute for, labour. In the early ages people converted their corn into flour by pounding it between two stones; they next hit on a contrivance which enabled them, by turning a handle, to make one of the stones revolve upon the other; and this process, a little improved, is still the common practice of the East. When the time came at which the labour and sufferings of slaves were thought worth economizing, the greater part of this bodily exertion was rendered unnecessary, by contriving that the upper stone should be made to revolve upon the lower, not by human strength, but by the force of the wind or of falling water. In this case, natural agents, the wind or the gravitation of the water, are made to do a portion of the work previously done by labour.

Cases like this, in which a certain amount of labour has been dispensed with, its work being devolved upon some natural agent, are apt to suggest an erroneous notion of the comparative functions of labour and natural powers; as if, in the case of things made (as the phrase is) by hand, nature only furnished passive materials. This is an illusion. The powers of nature are as actively operative in the one case as in the other. A workman takes a stalk of the flax or hemp plant, splits it into separate fibres, twines together several of these fibres with his

[2] Adapted from J. S. Mill, *Principles of Political Economy*, Book I, chap. i.

fingers, aided by a simple instrument called a spindle; having thus formed a thread, he lays many such threads side by side, and places other similar threads directly across them, so that each passes alternately over and under those which are at right angles to it; this part of the process being facilitated by an instrument called a shuttle. He is said to have done this by hand, no natural force being supposed to have acted in concert with him. But by what force is each step of this operation rendered possible, and the web, when produced, held together? By the tenacity, or force of cohesion, of the fibres: which is one of the forces of nature.

If we examine any other case of what is called the action of man upon nature, we shall find in like manner that the powers of nature, or in other words the properties of matter, do all the work, when once objects are put into the right position. This one operation, of putting things into fit places for being acted upon by their own internal forces, and by those residing in other natural objects, is all that man does, or can do, with matter. He moves a seed into the ground; and the natural forces of vegetation produce in succession a root, a stem, leaves, flowers, and fruit. He moves an axe through a tree, and it falls by the natural force of gravitation; he moves a saw through it, in a particular manner, and the physical properties by which a softer substance gives way before a harder, make it separate into planks, which he arranges in certain positions, with nails driven through them, or adhesive matter between them, and produces a table, or a house. He moves a spark to fuel, and it ignites, and by the force generated in combustion it cooks the food, melts or softens the iron, converts into beer or sugar the malt or cane-juice, which he has previously moved to the spot. He has no other means of acting on matter than by moving it.

Labour, then, in the physical world, is always and solely employed in putting objects in motion; the properties of matter, the laws of nature, do the rest.

Some writers have raised the question, whether nature gives more assistance to labour in one kind of industry or in another; and have said that in some occupations labour does most, in others nature most. In this, however, there seems much confusion of ideas. The part which nature has in any work of man, is indefinite and incommensurable. It is impossible to decide that in any one thing nature does more than in

any other. One cannot even say that labour does less. Less labour may be required; but if that which is required is absolutely indispensable, the result is just as much the produce of labour, as of nature. When two conditions are equally necessary for producing the effect at all, it is unmeaning to say that so much of it is produced by one and so much by the other; it is like attempting to decide which half of a pair of scissors has most to do in the act of cutting; or which of the factors, five and six, contributes most to the production of thirty.

See also "The World's Power Resources," page 329.

2. THE INFLUENCE OF GEOGRAPHICAL ENVIRONMENT

A. CLASSIFICATION OF TYPES OF INFLUENCE[3]

Man can no more be scientifically studied apart from the ground which he tills, or the lands over which he travels, or the seas over which he trades than polar bear or desert cactus can be understood apart from its habitat. Man's relations to his environment are infinitely more numerous and complex than those of the most highly organized plant or animal.

Four fundamental classes of effects of geographical environment can be distinguished.

I. The first class includes direct physical effects of environment, similar to those exerted on plants and animals by their habitat. Certain geographic conditions, more conspicuously those of climate, apply certain stimuli to which man, like the lower animals, responds by an adaption of his organism to his environment. Many physiological peculiarities of man are due to physical effects of environment, which doubtless operated very strongly in the earliest stages of human development, and in those shadowy ages contributed to the differentiation of races.

II. More varied and important are the psychical effects of geographic environment. As direct effects they are doubtless bound up in many physiological modifications; and as influences of climate, they help differentiate peoples and races in point of temperament. They are reflected in man's religion and his literature, in his modes of

[3] Adapted from E. C. Semple, *Influences of Geographic Environment*, pp. 1–2, 33–44. (New York: Henry Holt & Co.; London: Constable & Co., Ltd., 1911.)

thought and figures of speech. The cosmography of every primitive people, their first crude effort in the science of the universe, bears the impress of their habitat. The Eskimo's hell is a place of darkness, storm and intense cold; the Jew's is a place of eternal fire. Buddha, born in the steaming Himalayan piedmont, fighting the lassitude induced by heat and humidity, pictured his heaven as Nirvana, the cessation of all activity and individual life.

To such influences man is a passive subject, especially in the earlier stages of his development; but there are more important influences emanating from his environment which affect him as an active agent, challenge his will by furnishing the motives for its exercise, give purpose to his activities, and determine the direction which they shall take. These mold his mind and character through the media of his economic and social life, and produce effects none the less important because they are secondary.

III. Geographic conditions influence the economic and social development of a people by the abundance, paucity, or general character of the natural resources, by the local ease or difficulty of securing the necessaries of life, and by the possibility of industry and commerce afforded by the environment. From the standpoint of production and exchange, these influences are primarily the subject matter of economic and commercial geography; but since they also permeate national life, determine or modify its social structure, condemn it to the dwarfing effects of national poverty, or open to it the cultural and political possibilities resident in national wealth, they are legitimate material also for anthropo-geography.

IV. The next class includes the effect of natural barriers, like mountains, deserts, swamps, and seas, instructing or deflecting the course of migrating people and in giving direction to national expansion; it considers the tendency of river valleys and treeless plains to facilitate such movements, the power of rivers, lakes, bays and oceans either to block the path or open a highway, according as navigation is in a primitive or advanced stage; and finally the influence of all these natural features in determining the territory which a people is likely to occupy, and the boundaries which shall separate them from their neighbors.

B. TYPES OF ENVIRONMENT AND THEIR RESULTS[4]

The economic geographer of course recognizes that the human activities of a given region are influenced by many factors other than environmental. Racial, religious, historical, social, economic, political, as well as environmental, considerations all enter into the picture. The non-environmental factors at times and places indeed may be the dominating ones in explaining many of the observed economic facts. Race and creed and custom may and do modify the ways in which even such factors of environment as are controlling operate. The geographer's peculiar function, however, is to explain, as far as he may, the differences in the economic life and institutions that exist between regions and to determine the part that environmental forces have exerted—whether their effects be great or small—in producing those differences.

The basic concept on which the work of the geographer rests is this: the natural environment, while not the only factor, is one of the chief molding forces (if not the chief force) in man's economic life. Man is continually adjusting himself to his environment. Since man's economic life rests from its very nature upon securing a living from the earth, the best type of economic life is the one that is best adjusted to the physical environment. This does not imply that it should not also be well adjusted to the social and other conditions of the region. The natural environment, however, sets the stage. It furnishes the scenery. Climate and soil and topography and location are persistent and abiding. To them ultimately adjustments must be made, both in *kind* of development and in the *degree* of development. For a region is not to be measured, geographically nor economically, solely in terms of its resources; but also in terms of its fitness for supporting a people with the energy and initiative necessary to utilize the resources to best advantage.

Not only are physical factors fundamental to economic life; they are of increasing importance as the world develops and economic life becomes more complex. With the increase of world population, crowding on the means of subsistence, and with agriculture becoming more

[4] Adapted from G. R. Roorbach, "Economic Problems Involved in the Payment of International Debts," Round Table Discussions, *American Economic Review*, Supplement, XVI, No. 1 (March, 1926) 121–24.

complex as it becomes more scientific, nicer and finer adjustments of all kinds need to be made if the earth is to yield its maximum of food and raw materials. The best utilization of the land is, in part, a geographic problem. The best utilization of labor and management is also, apparently, in part a geographic problem.

In manufacturing industries the same is true. In the midst of competition, domestic and international, whatever contributes to the efficiencies and economies of manufacturing needs now to be more carefully considered. For example, the geographic location of a plant assumes an importance now that did not obtain when competition was less keen and almost any site would do. Location must be made with greatest care in reference to power, raw materials, markets, and climate. The exact determination of the effects of climate upon the energy and initiative of factory operatives and management was never so much needed as today. A wrong climatic location may overcome all other apparent advantages and lead to industrial failure. The engineer today locates his hydroelectric plant after giving more careful considerations than ever before to topography, to geology, to forest cover, to rainfall, to run-off, to evaporation, and to all the other factors, both physical and economic, that make for success or failure to the enterprise.

If the natural geographic factors are among the controlling forces in the economic life of man, we should expect to find that similar types of environment, under similar stages of development, would show similar types of economic adjustments. Or putting it in another way, from a given combination of environmental conditions the general type and potential characteristics of certain phases of the region's economic life should be indicated. There are many cases that indicate this may be the situation, although much more work must be done in the study of regions before we can speak with greater confidence.

Perhaps one of the best known and simplest illustrations of this is to be seen in the economic life of the so-called Mediterranean type of geographic environment. The Mediterranean region of Southern Europe, as we all well know, is characterized by a climate whose winters are cool and with moderate rainfall, and whose summers are long, hot, and dry. The topography of Mediterranean lands in general is rugged, with intermountain valleys, narrow coast plains and deltas, interior

plateaus and mountains. In response to these conditions, a distinct type of agricultural and pastoral life has developed, remarkably adapted to the climatic and topographic conditions. Winter grains—wheat and barley—that grow in the cool moist winter months and are harvested in the dry spring; drought-resisting tree crops as the vine and the olive; irrigation crops—fruits and alfalfa on the alluvial fans; large areas of lands too dry and too rugged for tilled agriculture utilized for grazing, and grazing especially of the poor land animals—the goat and the donkey. Its industries likewise reflect the environment—dried fruits, especially the raisin, the fig and the date, the prune and the apricot; the fruit and vegetable canning industry; the tourist industry; and the moving picture industry.

It is significant that the other widely separated sections of the earth that possess similar Mediterranean types of environment have developed similar methods of wealth production, even under different racial and social and political and historical backgrounds. Southern California is duplicating in its broad outlines the type of agricultural life found on the shores of the Mediterranean. In detail it differs; but the environment also differs in detail and the region is economically much younger. Differences in other factors, such as location, differences in population density, in racial elements, and so on, account for many of these differences, but they do not destroy the general similarity. Strikingly enough, the same features appear in the Central Valley of Chile, where the same Mediterranean type of environment exists, and also in the Cape Provinces of South Africa, and in the extreme south of Australia. And the more these regions develop the more closely do they come to the common type. The geographic type is distinct: the economic type is likewise distinct and is responding in similar ways to the similar geographic facts. We can speak safely of a "Mediterranean type of agricultural life." Clearly its basis rests on the physical facts of geography.

Nor is this illustration unique. Taking another type of environment as illustrated by the cool wet summers and mild but raw wet and stormy winters of Northwest Europe (Scotland and Scandinavia), the chief characteristics of its economic life reappear—or are reappearing as economic life develops—in regions of similar physical type on the Pacific Coast, in Washington, British Columbia, and

southern Alaska, in south Chile, in Tasmania, and in southern New Zealand.

In rugged interior regions, where transportation is difficult and expensive, invariably we find the money crops developed are of small bulk and high value; corn whiskey in the Kentucky Mountains; opium in Northwest China; coffee on the plateaus of Columbia; cocaine on the rugged eastern slopes of the Andes in Peru and Bolivia; butter and cheese in Siberia and New Zealand and Switzerland; tea in Central Japan and in the Assam Hills; these are but a few instances. So universally is this the rule that a general principle may be developed to the effect that the developed export resources of remote and rugged regions consist of high-valued, low-bulk goods, and the relation of value to bulk is roughly proportional to the degree of inaccessibility of the region.

These are all obvious and well-known illustrations among many that could be cited. They are suggestive of the influence of environment. But the student soon discovers that human activities are not always so closely related to the natural regions into which the earth may be divided, and that many economic features are not so obviously tied up to climate or topography or location or soils. Physical environment frequently does not appear to be the most potent force in shaping the existing life of a group. Migratory peoples bring with them into a newly-settled region, for example, methods of agriculture well adapted to the regions they have left, but ill adapted to the new regions to which they have come. It may be that for long periods the methods employed in the new environment reflect the method developed in the old environment and are ill adapted to the new. The farming methods of humid Europe and eastern United States first employed in western United States finally gave way, after much suffering and loss, to the conditions of aridity west of the 100th Meridian and a new and different type of agriculture has developed.

It is the task of the geographer to describe the region, establish the relations that do exist between the environmental facts and the economic, show how and to what extent other factors have modified the geographic, or the geographic modified the other factors that are at work in shaping the life of the region. Particularly is it of great practical importance, having established principles of relationships,

to point out how far the economic life of the region is failing to take full advantage of the natural opportunities; or to show, for an undeveloped region, what the probable or possible opportunities are for future development.

This type of regional economic geography can be of great value to the economist, to the historian, to the political scientist, to business, and to society in general. To describe scientifically the "economic landscape" and to explain and understand it, to develop principles by which one may soundly interpret the possibilities of a region and its limitations, as a place in which man can live and make a living is the distinctive field of the economic geographer.

See also "Man, the Adapter of His Environment," page 7.

3. THE FRONTIER IN AMERICAN HISTORY[5]

Behind institutions, behind constitutional forms and modifications lie the vital forces that call these organs into life and shape them to meet changing conditions. The peculiarity of American institutions is the fact that they have been compelled to adapt themselves to the changes of an expanding people—to the change involved in crossing a continent, in winning a wilderness, and in developing at each area of this progress out of the primitive economic and political conditions of the frontier into the complexity of city life. American development has exhibited not merely advance along a single line, but a return to primitive conditions on a continually advancing frontier line, and a new development for that area. American social development has been continually beginning over again on the frontier. This perennial rebirth, this fluidity of American life, this expansion westward with its new opportunities, its continuous touch with the simplicity of primitive society, furnish the forces dominating American character.

At first the frontier was the Atlantic coast. It was the frontier of Europe in a very real sense. Moving westward, the frontier became more and more American. As successive terminal moraines result

[5] Adapted from F. J. Turner, *The Significance of the Frontier in American History*, in the *Fifth Year Book* of the National Herbart Society, and an earlier edition in American Historical Association, *Report*, 1893, pp. 199–227.

from successive glaciations, so each frontier leaves its traces behind it, and when it becomes a settled area the region still partakes of its frontier characteristics. Thus the advance of the frontier has meant a steady movement away from the influence of Europe, a steady growth of independence on American lines.

The most important effect of the frontier has been in the promotion of democracy here and in Europe. The frontier is productive of individualism. Complex society is precipitated by the wilderness into a kind of primitive organization based on the family. The tendency is anti-social. It produces antipathy to control, and particularly to any direct control.

The frontier states that came into the Union in the first quarter of a century of its existence came in with democratic suffrage provisions, and had reactive effects of the highest importance upon the older states whose peoples were being attracted there. An extension of the franchise became essential. It was *western* New York that forced an extension of suffrage in the constitutional convention of that state in 1821; and it was *western* Virginia that compelled the tidewater region to put a more liberal suffrage provision in the constitution framed in 1830, and to give to the frontier region a more nearly proportionate representation with the tidewater aristocracy. The rise of democracy as an effective force in the nation came in with western preponderance under Jackson and William Henry Harrison, and it meant the triumph of the frontier—with all of its good and with all of its evil element.

So long as free land exists, the opportunity for a competency exists, and economic power secures political power. But the democracy born of free land, strong in selfishness and individualism, intolerant of administrative experience and education, and pressing individual liberty beyond its proper bounds, has its dangers as well as its benefits. Individualism in America has allowed a laxity in regard to governmental affairs which has rendered possible the spoils system and all the manifest evils that follow from the lack of a highly developed civic spirit.

To the frontier the American intellect owes its striking characteristics. That coarseness and strength combined with acuteness and inquisitiveness; that practical inventive turn of mind, quick to find expedients; that masterful grasp of material things, lacking in the

artistic, but powerful to effect great ends; that restless, nervous energy; that dominant individualism, working for good and for evil, and, withal, that buoyancy and exuberance which come with freedom—these are traits of the frontier, or traits called out elsewhere because of the existence of the frontier. We are not easily aware of the deep influence of this individualistic way of thinking upon our present conditions. It persists in the midst of a society that has passed away from the conditions that occasioned it. It makes it difficult to secure social regulation of business enterprises that are essentially public; it is a stumbling-block in the way of civil-service reform; it permeates our doctrines of education; but with the passing of the free lands a vast extension of the social tendency may be expected in America.

See also "The Transition to Laissez Faire," page 239.

4. THE CHIEF USES OF LAND[6]

A classification of natural resources (or land) used by man may be made as follows:

I. Subsurface utilization
  1. Water
  2. Minerals (including oil)
  3. Gas
  4. Stone
  5. Salt

II. Surface utilization
  1. Site appropriation
    a) Manufacturing
    b) Mercantile
    c) Residence
    d) Recreational and educational
      (Parks, forests, and streams; highways; museums, theaters, churches, schools)
    e) Transportation and communication
      (Highways, railroads, canals, rivers, lakes, oceans; stations, ports, and other terminals; telegraph and telephone routes)
  2. Soil appropriation
    a) Arid land

[6] Prepared by R. C. McReynolds.

(1) Irrigable (including irrigation reservoirs and ditches)
(Farm, garden, and orchard)
(2) Non-irrigable
(Timber, grazing, dry farming, desert)
b) Humid land
(1) Natural use
(Forest and pasture; swamps—rice, hay, cranberry, etc.)
(2) Cultivated use
(Forest, garden, orchard, and farm)

III. Super-surface utilization
1. Aircraft use
2. Radio use

Comparatively little land that is marketed today is in a state of nature. Man digs wells to obtain water for human and animal consumption and for irrigation; bores through soil, rock, and sand to obtain oil and gas; sinks shafts and carves out vast chambers underground in the process of obtaining coal, iron, copper, zinc, lead, gold, silver, and other minerals—unless he can obtain them by merely stripping off a surface layer of soil and rock or can get them on the surface of the ground; quarries rock; and extracts salt from lake beds or from the soil at the salt licks anciently used by wild animals. Man erects upon land buildings of multitudinous sorts in order that he may carry on manufacturing or trade, provide homes and places for recreation and education, and secure facilities for communication and transportation. The configuration of the land is much changed. The efforts of man to provide food lead to further efforts being spent upon the soil itself. Some desert land is transformed into humid land by the application of water from artesian wells or from irrigation reservoirs and ditches. Other dry land man makes produce some economic goods. Man appropriates forests, pastures, and swamps; and in addition cultivates land that timber, fruit, vegetables, grain, and live stock may be produced on it. Even the air is being used by aircraft and by radio sending stations.

B. The Effective Use of Natural Resources

In early cultures or civilizations, a given group could, in the main, make use of only those natural resources which lay near at hand. If those were abundantly available, the group tended to live well; if they were scanty, the group tended to live meagerly.

Today the situation is vastly different. Of course it is still true that a nation is fortunate if it possesses abundant and varied natural resources within its own boundaries, but today man's increased power of communication and transportation, his increased ability to co-operate effectively with other peoples, and his modern organization of trade and commerce make it possible for a given group to have access to the natural resources of other groups—possible to have a considerable degree of world-unity in the use of natural resources. Upon the one hand this accessibility has tremendously increased man's power to live well; upon the other hand it has caused many problems which were formerly regarded as national problems to become international issues.

The development of science—especially the development of chemistry—has profoundly affected the problem of the effective utilization of natural resources. Upon the one hand, it has greatly changed our estimation of the importance of certain materials; some materials once highly esteemed have now shrunk in significance, whereas other materials once regarded as waste and useless are now regarded as of the utmost value. Upon the other hand, it has greatly increased our power of substitution of one material for another; the word "synthetics" is a symbol of this development. Of all such changes it may again be said that they have tremendously increased man's power to live well—and they have caused many problems which were once regarded as national problems to become international issues.

A problem much discussed today is the conservation of natural resources. This problem is clarified when we reflect that conservation really means wise utilization or effective use. This major issue of wise utilization immediately breaks up into the following subissues: Are there any natural resources concerning the use of which we should be parsimonious? In view of expanding science, is it necessary to be parsimonious? May it be advisable to use all the available natural resources to an extent and in a way that attempts to protect neither us nor future generations against the exhaustion of those resources? How shall we make fully available to man's use resources that are present only in certain parts of the world? What are the most effective ways of applying the other social resources, such as labor and capital goods, to natural resources?

The following issues,[6a] if kept in mind, will cause the reading selections in this section to yield larger results:

1. In what types of cases has conservation of natural resources become a pressingly significant problem?
2. What changes in our social institutions—social organization—would facilitate conservation?
3. What are the more significant relationships of the growth of scientific knowledge to conservation?
4. What natural resources are of particular significance today in international relations?
5. Everything considered, what are the main elements in the problem of the more effective utilization of natural resources?

1. WASTE OF NATURAL RESOURCES[7]

It is not difficult to draw a very gloomy picture of the despoliation of a continent. The rape has been colossal and unparalleled in history. More difficult is the attempt to appraise the real economics involved, for, on analysis the simple dramatic sequence breaks down into many baffling and confusing parts.

Of course, it is conceivable that tomorrow or next day some new invention may revolutionize the whole case against waste in this category. If we could suddenly get unlimited cheap power out of the winds or out of the tides, the tears shed for devastated deposits of coal, oil, and natural gas would be largely maudlin ones—though the problem of by-products other than power would still remain. Similarly cheap nitrogen from the air would cause us to forget the ravages of the soil. Invention, we are ready to admit may knock the bottom out of much of the case for wasted raw materials—but such inventions are still in the womb of time, and to date the indictment stands.

Coal.—Beyond the wastes of excess capacity and idle man-power, how, specifically, is coal wasted? There are three main sources of preventable tonnage loss:

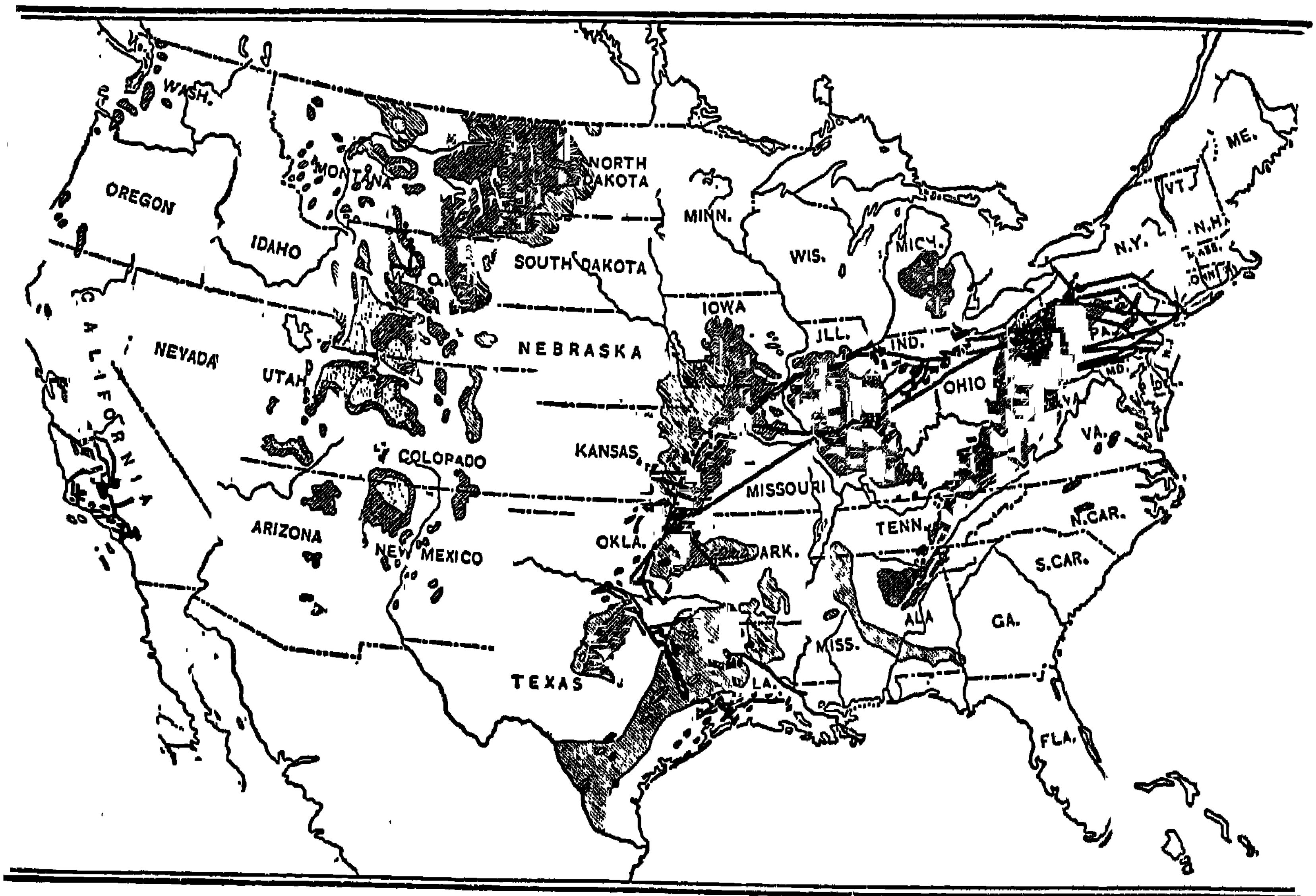
1. Bad technical methods underground.
2. Bad technical methods in steam-raising and heating.

[6a] A more detailed statement of issues may be found in *Outlines of the Economic Order*, pp. 58–61. (University of Chicago Press.)

[7] From S. Chase, *The Tragedy of Waste*, pp. 233–64. By permission of The Macmillan Company, publishers.

3. Failure to link coal and water power into regional super power systems.

And, perhaps even more serious still, is the failure to salvage by-products. Untold riches in fertilizers, dyestuffs, chemicals are allowed to go up in smoke—their only function to increase the ugliness, the ill health, and laundry bills of our cities. The smoke nuisance is thus a knife with a double edge—we waste power, heat, and by-products, in order to waste health, beauty, and cleanliness.



Reprinted by permission from *Business Geography* by Ellsworth Huntington and Frank E. Williams
Published by John Wiley & Sons, Inc.

THE COAL FIELDS, OIL FIELDS, AND PIPE LINES IN THE UNITED STATES

Mr. Hugh Archbald after long experience as a mining engineer, concludes that for every ton of coal brought to the surface, another ton is needlessly left in the mines; and that—if the technical arts of mining were fully utilized—one man, with no more effort, could do the work of four.

The governing policy of working the big seams—"skimming the cream"—destroys the thinner seam in the process. Coal mining is not the careful exploitation of a limited natural resource with a view to scraping the platter clean as the exploitation progresses; it is a furious

and chaotic enterprise in competitive salesmanship with a view to catching the market today, and let tomorrow take care of itself. There are technical methods for careful mining—the long wall method, for instance, that takes all the coal which can be taken; but American practice, governed by the hope of quick profits—or, what is more common, the hope of averting losses—clings to the antiquated room and pillar method, with its great margin of waste.

Figures from the Geological Survey and the Bureau of Mines summarize the waste of an average ton of soft coal burned in a steam boiler as follows:

	Pounds	*Per Cent*
Lost in mining	600	
Lost from mine to boiler room	126	
Gases going up stack	446	
Lost by radiation	51	
Lost in ash pit	51	
Lost in converting heat into mechanical energy	650	
Total losses	1,924	96%
Final utilization	76	4%
Total tonnage	2,000	100%

Thus only 4 per cent of the original ton is finally utilized. The combined losses aggregate 96 per cent. This is, of course, the theoretical table of the exact scientist. The 650 pounds lost in converting heat into mechanical energy is true enough, but only a fraction of the loss is preventable.

If every drop of the annual rainfall could be converted into electrical energy, the total would just about equal the present consumption of energy derived from coal in the United States. Obviously only a fraction of the rainfall can be so converted through the power of falling water in streams, and thus we have to face the plain fact that "white coal"—water power—can never act as a complete substitute for coal energy. What water power can do, is to diminish the annual amount of coal needed, and thus lengthen the life, and help to preserve the by-products, of the coal beds. Scarcely 15 per cent of the water power readily available has been developed to date; and only 7 per cent of that available if storage reservoirs were introduced. From

80 to 90 per cent of the horse-power to be freely taken from falling streams thus runs to waste. Why? Because it has been cheaper to skim the cream from coal and oil, with their relatively smaller capital cost per unit of horse-power.

Water power may be introduced at isolated points into the industrial system to some advantage, but the great potentiality of the savings to be made from it is only realized through the co-ordinated planning of super power systems where coal is co-ordinated with water power. Giant power is one of the bravest and most exhilarating glimpses of Utopia which engineers and scientists have ever dreamed. It not only saves coal and oil, it electrifies the railroads, lightens the traffic burden, abolishes smoke and soot and grime, runs cheap power to the farm and the country town, make—as Ford makes—for industrial decentralization, for less congestion in the cities, for more life and vigor in the country. One's eye follows the sweep of the great high voltage lines as they charge the hill and dip to the valley—straight and true and infinitely powerful—and for an instant one glimpses the end of meanness, poverty, disorder; a world set free!

Apart from by-products, what is the approximate waste in tons of coal mined per year? We have been assured that for every ton taken out of the shaft another ton is left unreclaimable below ground. If 500,000,000 tons are taken out in a year, it follows that 500,000,000 tons are annually lost in the underground workings. Of the 500,000,000 taken out, ineffective utilization wastes at least half the tonnage. From which it follows that 250,000,000 tons more is wasted by reason of bad methods above ground. On the basis of Mr. Baum's super power zones, a material addition might be made to this figure, but waiving such addition as a margin of safety, it would appear that in terms of the natural resources alone, the annual bill of loss is some 750,000,000 tons. And to this we must add the tremendous tonnage of unreclaimed by-products—ammonium sulphate, gas, tar, dyestuffs and chemicals. Is it to be wondered that Mr. Hoover has termed coal the "worst-functioning industry in the country"?

Oil.—Petroleum, like coal, possesses a hideously wasteful technique for getting the product out of the ground, but unlike coal, its utilization once it gets to the pipeline, is, broadly speaking, reasonably efficient. What petroleum gains in this field, however, is quite

gorgeously made up for in winning oil from the ground. For every ton of coal produced, another ton is needlessly left in the mine; for every barrel of oil produced three barrels or more are left underground, or wasted in well operation. "Less than 25 per cent of oil in the ground reaches the pipeline."

Petroleum collects in great underground pools. Over the top of the pool gathers gas—valuable gas for two reasons: it has in it many of the properties of the oil itself; and only by its pressure downward on the surface of the pool, may all the oil in the pool be driven above ground. Now the pool and the gas over it form a geological unit. To be efficiently exploited it must be treated as a unit. One engineering control should govern it, allowing only enough wells—reasonably spaced—to give the most effective outlet for oil. Care must be taken to save the gas below in order to help the oil upstairs. Gushers must be resolutely choked; seepage and water infiltration must be guarded against; in brief the known technical arts applied, and the job done aright. In this way it is possible for nearly all the oil in the pool to reach the pipe line—and in no other way is it possible.

Meanwhile the ground over the pool is divided into property lots. The assumption of the law is that each man's boundary goes downward in a vertical plane, and so much of the pool as the plane bisects is his. But it isn't his, because of the aforementioned deplorable behavior of the pool. The pool will rush to the pipe which gets down first, or to certain pipes by virtue of their underground location. The owner of the lot is aware of this. So he drills as many wells as he can, as fast as he can, and preferably along the next owner's boundary line, in order to get the lion's share of the pool's activity. Thus the pioneer with his stark individualism, and his property laws which will not work with geological units, has succeeded in throwing away three barrels of oil out of four. While the engineer, who handles geological units with geological laws, could save the whole four barrels.

Coal, water power, oil and natural gas—the Big Four of power—present the outstanding examples of waste in inorganic natural resources. In an age of power they are particularly vital to our survey. But they do not constitute the only losses to be reckoned with in this category. Underground methods and utilization methods in tin, cop-

per, zinc and other metals have been subjected to much critical review.

Lumber.—When the Pilgrims landed on Plymouth Rock there were some 800,000,000 acres of virgin forest land in the country. There remain today 138,000,000 acres. In addition there are 114,000,000 acres in second growth, saw timber size, 136,000,000 acres in second growth, cordwood size, and 81,000,000 acres of original forest land on which nothing is growing.

Of the total annual cut, nearly 65 per cent is wasted in field and mill according to Arthur D. Little. In the yellow pine belt, the value of rosin, turpentine, alcohol, pure oil, tar, charcoal, and paper stock thrown away is three times the value of the lumber sold. Enough yellow pine is lost in milling methods, or left to rot on the ground to make double the paper tonnage in the United States. Meanwhile pulpwood for paper making is imported from Norway, loaded onto freight cars, and shipped 1,000 miles inland!

Not more than one board foot of finished lumber appears for every four feet cut in the woods. Two of the four are left in the forest, or fed into the saw mill burner or are lost in seasoning before the stage of rough seasoned lumber is reached. The third foot disappears in manufacturing. Hickory handle makers buy two tons of lumber and sell 400 pounds of handles. In many furniture factories, unskilled labor and inadequate supervision net only 30 per cent of the lumber received. The circular saw is used because it is quicker, but it leaves about three times as much sawdust on the ground as the band saw.

Of course all the wood in the tree is not economically utilizable. Beyond the leaves and the twigs and the roots, a certain amount of the stumpage would never pay for its conversion into usable products. There is a considerable margin of unavoidable waste. But there is perhaps an even greater margin which might be prevented if the pioneer gave ground to the engineer. When a tree is cut down, the lumberman hauls out in logs perhaps 80 per cent of its cubic volume. The rest is left to rot as stumps or tops awaiting the forest fire. In the mill, sawdust and slabs lop off another 40 per cent, to be burned as fuel or thrown away. Meanwhile the destructive distillation of a cord of this waste will yield:

50	bushels of charcoal
11,500	cubic feet of gas
25	gallons of tar
10	gallons of crude wood alcohol
200	pounds of acetate of lime

Furthermore much of this slab is suitable for pulpwood in the process of paper making. Into the hands of eager straphangers goes 2,000 acres of forest every year, for each and every large New York newspaper. If this maw could be fed from slab wood, now discarded, many thousands of acres of standing timber could be saved—saved, who knows, for an ultimate use of an even more rewarding nature. Wood like coal (and coal is only decayed and compressed vegetable matter) will yield great riches in by-products; and like coal, their extraction has been very largely neglected.

Lumbering methods have played into the hands of forest fires—magnificently. In the five years from 1916 to 1920, there were 160,000 reported fires which burned over 56,000,000 acres of land, destroying $86,000,000 worth of timber, while the damage to the nitrogenous humus of the soil was probably even greater. This is an average of about 10,000,000 acres a year. Besides destroying timber, soil, animal life—and often buildings, forest fires have ruined great areas for recreation purposes. The technique for their control is known, but its application advances very slowly. And as a corollary to timber mining, and the fire which, like Nemesis, follows, the slopes of the hills above the rivers are gutted, the watershed refuses to hold its water, and the streams swollen by waste, sweep down to waste and destroy the fertile fields below.

A SUMMARY

The volume of known waste in natural resources by physical count may be recapitulated as follows:

Coal	750 million tons per year
Water power	50 million horse-power per year
Oil	1 billion barrels per year
Natural gas	600 billion cubic feet per year
Lumber	5 billion cubic feet per year
Metals	Unknown total
Soil	Unknown total
Animal life	Unknown total
By-products and raw materials lost in manufacture	Unknown total

In this light it cannot be said that the conservation movement for all its brave promise has much to show in net accomplishment for the generation since its birth. By and large, the pioneer and his methods remain the masters of the nation's ever declining store of natural resources.

2. CLASSIFICATION OF RESOURCES FROM THE POINT OF VIEW OF CONSERVATION[8]

The real heart of the conservation problem presents an issue which taxes the resources of economic theory to the utmost. This issue is the problem of adjusting the conflict between the interest of present and future. In America the possibilities of conservation have been considered largely from the standpoint of natural science, while the economic limitations have been but little appreciated.

It is first necessary to determine the relation between the utilization of natural resources and their exhaustion. If utilization did not result in exhaustion, the problem of conservation, as it was stated above, obviously would not exist. Accordingly, natural resources may be classified as follows:

I. Resources which exist in such abundance that there is no apparent necessity for economy, either in present or future; for instance, water in some localities.

II. Resources which will probably become scarce in the remote future, although so abundant as to have no market value in the present; for instance, building stone and sand in some localities.

III. Resources which have a present scarcity—
1. Not exhaustible through normal use: water-powers.
2. Necessarily exhausted through use, and non-restorable after exhaustion: mineral deposits.
3. Necessarily exhausted through use, but restorable: forests, fish.
4. Exhaustible in a given locality but restorable through the employment of other resources of a different kind or of similar resources in different locations: agricultural land.

3. THE OIL INDUSTRY'S ANALYSIS OF ITS CONSERVATION PROBLEM[9]

The Board of Directors of the American Petroleum Institute at a meeting in New York on March 27, 1929, unanimously accepted the

[8] Adapted from L. C. Gray, "The Economic Possibilities of Conservation" in *The Quarterly Journal of Economics,* XXVII, 499–509 (May, 1913).

[9] Adapted from the *Texaco Star.* (The Texas Corporation.)

report of its General Committee on Conservation. The report is as follows: [The first five sections are here omitted.—ED.]

Sixth: That so long as serious over-production exists in the world, a permanent organization within the American Petroleum Institute should be formed for study of the situation, not only in the United States, but throughout the world. Such an organizaion would work closely with the Department of Commerce and the Federal Oil Conservation Board for the freest possible dissemination of knowledge of conditions in the separate regions and in the aggregate.

Seventh: That the present committees of the American Petroleum Institute, or new committees working under the general plan of the present committees, together with such sub-committees as the Board may consider desirable, take up for further study and action some of the topics suggested in the general chairman's address on March 15th, and we make the following suggested outline in this connection:

(1) General Committee, to

a) Ascertain whether Federal aid or legislation is now considered necessary, and if so, the extent and nature of such aid or legislation as would be needed to sustain control of production as well as to give the necessary support, if such authority is needed, to cooperate with other nations in the world wide conservation and orderly development of petroleum deposits; and to deal, to whatever extent is necessary and desirable, and permissible, with the world situation, having in mind that this is possibly essential to the success of any real, effective, conservation plan.

b) Determine whether we, as an American Nation, should find it desirable to encourage the same degree of restriction and conservation on the part of foreign fields as of our own, or whether it would be in our interest to assume the larger share of restriction here at this time in order to prolong the life of our own fields or deposits.

c) Consider what may, and should be, the attitude of countries which are producing petroleum as differing from those countries which do not produce. Should not the countries without production have quite as much, if not more, interest in the conservation and control of production as those countries which are exhausting their known supplies? Take such action as may be necessary to create accurate representations and importance of the plan which we are undertaking.

d) Determine more accurately the extent to which crude production, as a whole, may possibly be reduced to bring about a satisfactory reduction in stocks and constitute a more substantial conservation.

e) Determine what can be properly undertaken to encourage a check on wasteful consumption of petroleum products as a part of the conservation activities.

f) Assume the responsibility for maintaining, with such national and state aid as can be secured, the orderly control of production and making of such adjustments from time to time as are necessary to make the plan workable and effect the purpose of same.

(2) Regional Committees, together with such subdivisions, or State committees as the Board or regional committees may find desirable to appoint, should consider the following:

a) The possibilities of such control with such cooperation as is possible within the industry today.

b) Whether state legislation is necessary, and if so, the precise nature of such required legislation in each of the states, particularly where the overproduction situation exists and where it may most likely be a problem in the future.

c) To what extent the regulation and control of gas production will contribute to the plan and be an aid to the permanent success thereof, and take action to bring about an acceptable and satisfactory solution of this feature of petroleum production.

d) To what extent more uniform leasing contracts and provision for zoning, or unit operation, either voluntarily or by law, would be an aid, and try to agree upon a plan for such zoning as is essential in preventing extravagance and waste.

e) Determine what can be saved to the industry and to the consumer by a more orderly and more economic system of producing oil and of such drilling only in new developments as is necessary to clearly define the field and that will produce the oil under control, and compare this with the cost of waste of recoverable oil when there is no control, or when the oil is taken out rapidly, as in many instances, and water encroachments and gas depletion take place prematurely.

f) Ascertain the cost to the industry of storing and carrying such excess stocks as will probably accumulate if production continues at the present rate; and what can be saved if substantial underground deposits can be ascertained and maintained.

g) Determine what will probably be the effect of geophysical instruments and other scientific aids in locating oil deposits, and the desirability of encouraging such activities and discoveries with a view of having more accurate knowledge of deposits, and the effect of such determinations in giving stability to the industry. The effect of such discoveries with or without control of production. Also the advantages of such determinations as against the difficulty, expense and delay of development in the event known supplies should decline below the actual minimum market requirements.

h) Determine the cost to the industry of the present fuel oil situation as against the markets and conditions applying when fuel oil prices were such that coal

was on a competitive basis for steamship and shore installation, and ascertain what effect and advantages might be derived by the coal industry and possibly railroads and other affected interests if we were to reduce fuel oil manufacture by, say 50% under the 1928 production.

i) Determine as accurately as possible the probable recoverable oil from present known or producing fields of the world, as well as the opinion of those who are considered best qualified to determine or estimate the possible amount of oil that is yet undiscovered but that may possibly be made available in the future.

4. CONSERVATION AS APPLIED TO THE FUR TRADE[10]

The encroachment of civilization on areas which support wild life and a constantly growing demand have been steadily depleting the world's supply of furs. This movement, which began to be felt at the close of the last century, is now assuming a serious aspect. Some measures of conservation will be necessary to insure a supply for the future.

Every continent, almost every country in the world, makes some contribution to the stock of this common luxury. North America and Russia, including Siberia, produce the rarest and most desired skins. From Russia come ermine and sable while from Canada come silver fox, white fox, white bear and from Alaska, sea otter and seal. From South America on the other side of the equator comes chinchilla and from Bokhara, in central Asia, comes broadtail. So great has the demand for furs grown in the present century that today almost every species of fur-bearing animal is used under its own name or a pseudonym. The American muskrat, a country pest, has transformed waste swamp lands of the United States and Canada into profitable fur farms. The Australian rabbit that threatened ruin to that country's agriculture has been turned into a source of revenue, while the skunk and weasel, the alley cat and the Chinese dog have made a place for themselves in the fashion world under more attractive names.

As the world used more furs, more furs were produced. That is, more men went into the business, trappers went further afield and tapped new sources. This method succeeded in satisfying a rapidly expanding market with desirable skins at rising prices, but such a practice could not be continued without danger to future supplies.

[10] Adapted from "The World's Fur Supply," *Commerce Monthly*, IX, No. 10, pp. 23–27. (The National Bank of Commerce, 1928.)

Another factor that has presented a constant menace to the world's fur supply has been expanding settlements. As new lands are opened up people move in and clear away the forests and wooded regions, so depriving the wild fur-bearers of their homes and their food supplies. Although many of the smaller fur-bearing animals such as rabbits and skunks continue and even thrive in settled areas, a number of animals yielding more valuable pelts, such as fox and beaver, are driven out.

Conservation.—Exploitation of the world's fur supplies has not been allowed to go on uninterrupted or unmolested. Since 1900 measures for conservation have received serious consideration and a concerted effort has been made to perfect administrative organization. In Canada as in the United States, conservation measures have been left to the local governments. Practically every province of the dominion, as practically every state of the Union, has taken some action to restrict the activities of trappers. Licenses are required for both trappers and traders throughout Canada and parts of the United States. Closed seasons for the rarer animals and heavy fines for trapping out of season are other restrictions exercised in most regions. However, lack of uniformity and the great area covered by trappers, certain sections of which are very remote, greatly complicate the problems of enforcement.

One measure of conservation which has met with considerable success and bids fair to furnish a solution for part of the present problem is fur farming. The modern development of this movement had its beginning on Prince Edward Island where early in the 1880's several attempts were made to raise silver foxes in captivity. But it was not until 1894 that success was attained. With success assured in raising foxes for their pelts, experiments were tried with other animals. Some of these are raised under more or less natural conditions. Muskrats, for instance, are in most cases permitted to live in swamps, seek their own food and care for themselves, "farming" being nothing more than protection from independent trappers and to some extent from their natural enemies. A muskrat farm is fenced by sinking a wire mesh under the surface to prevent the rats from wandering away.

The United States government has also been active in this form of conservation. By a treaty with Japan, Russia and Great Britain the United States alone can take Alaskan fur seals and care is always

exercised to assure no decline in the herd. The skins are sold in the St. Louis market and the returns apportioned among Japan, Russia, Canada and the United States. In connection with the seal rookeries the Federal Government maintains several fox preserves where the herds are cared for and a strict closed season is kept, although the animals are not raised in captivity.

5. SCIENTIFIC RESEARCH AND NATURAL RESOURCES[11]

So long as a raw material is plentiful and cheap, there is little spur toward devising a man-made substitute for it. But as soon as the pinch of scarcity is felt or monopoly raises the price of the natural product wits are put to work to offset the limitation. Synthetics, therefore, have been called the weapons with which industry defeats monopolies of its raw materials. Camphor, for example, was long regarded as an almost impregnable natural monopoly, but today a large share of its best market, the United States, is supplied by the synthetic product.

Scarcely an industry exists which is not now affected by or dependent on these compounded products, which are remaking the organization of trade in many lines. "Synthetic" is here used broadly rather than in its strict scientific connotation. Rayon, the resin compounds, artificial leather, lacquer, celluloid, synthetic fertilizer, are a few of the comparatively recent contributions that science has made to modern industry. Others of outstanding importance are just coming to the stage of commercial utilization—the successful production of motor fuel from coal, for example. Practically no natural product is entirely safe from the possibility of competition from a synthetic rival. Sometimes years of endeavor find no commercial application. Rubber, for example, can now be made in the laboratory but at a cost still too high to compete with the natural product. Even though the synthesis of a product seems to baffle the chemist or the artificial product is too expensive to be commercially successful it is worth recalling that aniline (the basis of the present dye industry) was first isolated in 1826 only after seventeen years' research and then as a result of five men's effort. Even then more than thirty years elapsed before the

[11] Adapted from J. B. Collins, "Synthetics in Industry," *Commerce Monthly*, VIII, No. 8, pp. 3–12. (The National Bank of Commerce, 1926.)

final step was completed that provided the foundation of the modern coal-tar dye industry, the influence of which has gone far beyond the boundaries of chemistry.

The overcapacity that characterizes most industries gives rise to an intensely competitive condition which calls for lower production costs. Chemicals to take the place of natural raw materials and research to devise improved methods of manufacture offer a possible solution to this problem in many instances. Synthetics possess four advantages of paramount importance to the manufacturer in reckoning costs, which are calculated to make permanent their replacement of the natural product they supplant. These advantages are: price stability; usually lower prices since the new product must win its market from the older natural one; uniform quality; and rapid adjustment of supply to meet the demand. Synthetics are not artificial in the sense that they are an imitation of the natural product. They show a similar chemical composition, but being produced by carefully regulated rather than natural means they are of even quality with impurities and imperfections largely removed. Some synthetics have created their own market or satisfied a demand not met by natural products; in practically all cases synthetics have become so essential that those industries into which they enter could not now be carried on without them.

The coal-tar dyes are, perhaps, the best-known examples of the displacement of natural by synthetic products. But no extended discussion need be made here of either the dye or the drug industry. Both of them are largely dependent for their continued existence on synthetic compounds.

Nitrocellulose is the source of perhaps the most important group of synthetics outside the coal-tar products, a group that affects a very wide range of industries. Its base is cellulose, the structural material of the plant world. Nitrocellulose is made from wood, cotton or some other readily available cellulose treated with sulphuric and nitric acids. Rayon, so-called artificial wool, lacquer, cellophane, artificial leather and celluloid are some of the best known nitrocellulose synthetics.

One of the materials used in manufacturing the pyroxylin plastics is camphor; and this product exemplifies one of the most interesting

contests between a natural monopoly and a man-made substitute. Natural camphor is obtained from the distillation of camphor wood. For more than twenty years the Japanese Government has maintained a monopoly of crude camphor. With practically no competition, supplies were restricted and prices maintained.

A synthetic camphor had been developed years ago, but only recently is it being made in commercial volume. But within the past four years, when a new process was perfected, German synthetic camphor, by reason of its uniform quality and attractive price, has taken away a large part of the American trade which was Japan's best outlet. Early this year the Japanese Bureau of Monopolies, the government department which controls the output and sale of crude camphor, announced that prices paid to producers of Japan and Formosa would be reduced 25 per cent. in a direct effort to meet the competition of the German synthetic camphor.

A dramatic contest is that between natural and synthetic nitrogen fertilizer. Chile has practically a monopoly of natural inorganic nitrates in commercial deposit. A combination of Chilean nitrate producers was effected some years ago to regulate supply and prices. After several years of experiment, Germany, then the heaviest user of the Chilean product, began commercial production of synthetic ammonia in 1913. Nitrogen fixation by the cyanamide process had begun there in 1908. During the war Germany was entirely cut off from Chilean nitrates, and necessity forced the rapid development of synthetic processes to supply Germany's requirements for explosives as well as fertilizer. But since the war production has continued to expand. Thus Chile in little more than a decade has not only permanently lost its former best customer but has acquired a strong rival in the international markets.

In countries which do not have the United States' advantage of adequate petroleum supplies, the relatively high cost of motor fuel has hampered automotive development. Substitutes for gasoline as a motor fuel are reaching commercial practicability in Europe with the success of the coal liquefaction process. Experiments have been carried on in Germany for many years and recent announcements indicated that commercial production by the Bergius process was now possible. England is working on gasoline synthetics and French chem-

ists also have stated lately that a somewhat different process of coal liquefaction upon which they have been experimenting is now commercially practicable. France, however, suffers from the handicap of limited coal resources and the necessity of importing considerable quantities.

In the petroleum field itself improvements in refining such as the adoption of "cracking" processes have enormously increased the potential supply of gasoline and have given the industry a greater flexibility in proportioning the output of its various products to market requirements. By this process allied petroleum products can be converted into gasoline through molecular changes induced by the application of heat and pressure.

Broadly defined, a variety of synthetic materials are being used in building. The old-time slate or tin roof has been largely replaced by a variety of composition materials of which felt, tar, asphalt, cement and asbestos are among the constituents. Concrete, stucco, and composition wall-boards and floorings are frequently substituted for brick, stone, lumber and plaster.

Bakelite is one of the synthetic resins developed by American concerns. This material, familiar to every builder of a radio set, is a hard, amber-like product made of carbolic acid and formaldehyde and has been commercially manufactured for about 15 years. Bakelite now is practically a staple commodity for pipes, grinding wheels, jewelry, automobile accessories and other products. It is particularly valuable in electric insulation and mechanical fields because of its stability under normal conditions. Redmanol and condensite are other synthetic resins similar to bakelite.

Many synthetics of minor importance are of recent origin. Organic glass, made from synthetic resin, has lately been perfected. It is flexible, takes a high polish and possesses several advantages over ordinary glass, although its commercial exploitation is still in the beginning. "Dry ice," made of carbon dioxide, is being successfully used by ice-cream manufacturers, meat packers, and other users of refrigeration in place of ice. Ethylene glycol, a synthetic anti-freeze material, possesses the best properties of alcohol and glycerine and it is expected to offer serious competition to both these anti-freeze mixtures. A turpentine substitute and synthetic shellac are two other

recent additions to the list. Chemical tanning materials have been in use for some years and many of the remarkable effects seen nowadays are due to these tanning agents. Probably about half of the leather produced in the United States is now chrome tanned and chemical tannins are a genuine necessity.

European countries have devoted considerable attention to research, but in the postwar years financial difficulties have forced them to limit their activities. Until recent years the United States has lagged behind in industrial support of pure scientific research, owing largely to its rich natural resources. This indifference is changing, however, for American industry now recognizes the commercial value of research. Impetus to the movement has come through the campaign to establish a national endowment fund to advance pure scientific research. Its purpose is to raise a large sum to be used to promote research work in American universities, as it is realized that this type of scientific investigation is the foundation of all so-called practical research. Examples are the recent establishment of a fund for petroleum research; work carried on by the tanning industry; the research activities of the railroads, the building materials organizations and the leading chemical companies; the improvement in tire construction, to a large extent the result of laboratory work since 1921.

From $100,000,000 to $200,000,000 a year is now being spent on industrial research in the United States, and as this tendency is comparatively new in American industry this total may be increased considerably in the next few years. In addition to Federal research bureaus, several large industries and some thirty trade organizations carry on practical research. Further impetus to research results from the efforts of producers or manufacturers of a natural product to meet the new competition of a synthetic substitute by combining their efforts to study the possibilities for widening the use of the older product and improving its quality.

6. WORLD INTEREST IN BASIC RAW MATERIALS ILLUSTRATED BY MANGANESE[12]

The Russian Soviet Government in June, 1925, awarded to Americans the concession to operate the manganese mines of Chiaturi, the

[12] Adapted from "The Manganese Situation," *Commerce Monthly,* VII, No. 5, pp. 27–28. (The National Bank of Commerce of New York, 1925.)

most extensive deposits in the world. Competition was keen among international interests for this desirable award, which opens the way to an enlarged supply of manganese ore for the world's steel industry.

Manganese in some form is practically indispensable in the manufacture of steel, almost all of which contains it in certain proportions. In the production of ordinary steel by the Bessemer and open-hearth processes it is essential that a small amount of manganese be used and in making special manganese steels 10 to 12 per cent. of manganese may be added. The functions of manganese in steel making are to serve as a deoxidizer and recarburizer and to impart essential qualities of toughness and hardness.

In the open-hearth process manganese is added in the form of ferromanganese and in making the higher carbon Bessemer steel as spiegeleisen, each of which is an alloy of manganese and iron. Low-grade ores containing from 10 to 35 per cent. of manganese may be added directly in the smelting of pig iron without being previously converted into a ferro-alloy. Normally the standard manganese content of ferromanganese ranges from 78 to 82 per cent., that of spiegeleisen 18 to 22 per cent. and manganiferous pig iron contains from 4 to 10 per cent. manganese. Accompanying the trend in steel making from the Bessemer to the open-hearth process, demand for spiegeleisen yielded to more extensive use of ferromanganese.

Annual world requirements of manganese ore are estimated to be 1,750,000 tons. If the leaner ores are to be utilized a larger quantity would be required. More than 95 per cent. of all manganese ore consumed in the United States is used by the steel industry. The remainder is used in the manufacture of dry batteries, glass, chemicals and to a certain extent in paints.

A half century ago iron was used principally in the form of cast or wrought iron which requires no manganese. The discovery of manganese steel by Sir Robert Hadfield in 1883 gave tremendous impetus to the study of alloy steels. Other steel makers began research resulting in the discovery of a large number of additional alloy steels.

During the war the manganese situation was so acute that considerable sums were spent in developing manganese production particularly in the United States and Brazil. In the United States output increased from little more than 4,000 tons of ore in 1913 to more than

300,000 tons in 1918. High-grade manganese ore contains 35 per cent. or more of manganese. The deposits of high-grade ore in this country are sufficient to meet only a small portion of normal domestic requirements. With the slump of 1921 output fell off to 13,000 tons. World iron and steel production declined and this resulted in smaller demand for manganese. In 1923 the iron and steel industry in this country reached record proportions. Again the probability of a manganese shortage arose. For the time being increased production in India and Russia provided necessary supplies although at high prices. Recent developments in the Russian fields promise to furnish the world with a normal supply.

Although manganese deposits occur in some form in many parts of the world, it is not economical, except in case of emergency, to work most of the deposits outside of Russia, India and Brazil which before the war produced 95 per cent. of world supplies. Small quantities are shipped from Egypt, Cuba, Mexico, West Africa and Japan. Prospects appear favorable for increased supplies from the Gold Coast, British West Africa. There are possibilities of developing manganese mining in other countries but as yet the resources have been mostly speculative.

See also:
"Concentration in the International Field," page 877.
"International Relationships in Manufacture," page 280.

7. THE WORLD'S POWER RESOURCES[13]

A consideration of the dependence of civilization on power raises two important questions: What is the extent of the power resources upon which we rely at present, and to what new resources may we turn when our present energy supplies begin to fail?

The greatest source of energy that we use is coal. Coal stirs into life the wheels of most of our industries, carries most of the world's commerce, produces most of our electricity, and makes possible the large production of iron and steel. Coal is a non-reproducible resource. The physical limit need occasion no fear for the future, but all coal is not of equal quality and the supply for particular purposes may be quite limited, as is the case with anthracite. Some coal has so much

[13] From an unpublished manuscript prepared by E. L. Rauber.

sulphur in it that it is ruinous to use it in making some steels. Some has such a large percentage of ash and sulphur that it is poor fuel for making steam. Some is lignite or brown coal which makes a very poor fuel in its raw state. Moreover, a large fraction of the total supply of coal is in thin seams. Again, some is so deep that mining is very expensive. Part of the coal supply is scattered about in places that are very difficult to reach—in the Andes mountains of South America or in the Rocky Mountains in the United States. Only the direst need for coal may ever bring all these coal fields into operation.

COAL RESOURCES OF THE WORLD*

(Millions of tons)

Continent	Anthracite	Bituminous	Lignite	Total
North America	21,842	2,239,683	2,811,906	5,073,431
Asia	407,637	760,098	111,851	1,279,586
Europe	54,346	693,162	36,682	784,190
Australasia	659	133,481	36,270	170,410
Africa	11,662	45,123	1,054	57,839
South America	700	31,397	....	32,097
World Total	496,846	3,902,944	2,997,763	7,397,553

* From E. C. Eckel, *Coal, Iron, and War*, p. 108. (New York: Henry Holt & Co., 1920.)

North America has by far the greatest coal reserve. Canada possesses only 7 per cent of the world supply. Mexico and Central America have little or no coal. The coal lands of the United States are in six sections: Eastern, Interior, Gulf, North Great Plains, Rocky Mountains, and Pacific Coast. The last four of these sections possess by far the greater part of the United States' supply. In the first two are found all the anthracite and most of the best steaming coal. (There is some coal in Alaska.)

Asia possesses the next largest coal reserve. Five-sixths of the Asiatic supply is found in China and has remained untouched for centuries. The anthracite beds of the United States underlie only 500 square miles in Pennsylvania and are found in twisted and broken seams. In China there are in the Hoang-Ho Valley some 18,000 square miles of anthracite, lying in thick seams, level and undisturbed, and in some places outcropping on hillsides so that trains could be run right into them. There is bituminous coal to be found in all parts of China.

Of all the Asiatic countries Japan possesses the most meager supply and that is not of good quality. Asiatic Russia undoubtedly possesses extensive fields.

Europe's coal supply is found chiefly in four districts: the British Isles; the Rhine Valley, including the Ruhr and Saar Basins, the Namur field in Belgium, the Department du Nord and the Departement Pas de Calais in France; the field at the juncture of Germany, Poland, and Czechoslovakia, the richest portion being in Upper Silesia; and the Donetz Basin in Russia, bordering the Black Sea.

While coal has been cheap and plentiful we have asked for only the best grades, anthracite and the higher grades of bituminous. Three ways of extending the life of the world's coal pile would be to utilize lignite and peat, save the pulverized and slack coal which is now wasted, and to refine or distil the coal and save the liquid and gaseous products which are now largely wasted. Lignite and peat in their natural state are poor fuels because of the large percentage of water they contain; subjected to mechanical pressure at a temperature of about 300 degrees Fahrenheit, the moisture can be reduced to 6 per cent of the total volume and the heating power raised to 60 per cent or 70 per cent of that of coal.

Unlike coal electricity has no fixed limits to its future development. As long as there exists some mechanical power that can be made to turn a dynamo it will be possible to produce electricity. At present it is produced chiefly from two sources, steam power and water power —carbo-electricity and hydro-electricity. The dependence of electricity upon steam power in the United States is explained by the cheap and plentiful coal supply of the country. It is estimated that 200 million horsepower of electrical energy may be developed in this country with proper storage facilities for water—enough to turn every industrial wheel and light every building and street in the country. Moreover, this great energy resource is country-wide in its distribution.

Our neighbor, Canada, has water resources amounting to twenty-six million horsepower without storage. In Europe, Norway possesses unusual resources from her mountain stream, glacial lakes, and glaciers, and she leads the nations of Europe in the development of hydro-electricity. The Italians are using the snow-fed waterfalls of the Alps to make up for a similar lack of coal. Japan is turning to water

power to make up for a lack of coal. In India the waterfalls from three lakes ninety miles away can furnish the city of Bombay with 30,000 horsepower. The many fine waterfalls in South America are now being made to produce electricity to run railroads and growing industries. In Africa the power of the falls of Zambezi may some day be carried to the gold fields of Johannesburg, 700 miles away.

Petroleum, the energy resource most recently enslaved, is also the most limited in extent. Like coal, petroleum is a non-reproducible resource. The United States Geological Survey estimate of petroleum resources in 1921 was that 45 billion barrels remained unmined. Probable additional deposits were estimated at 20 billion barrels. The United States has about one-fifth of the total known deposits and one-seventh of all the probable total deposits of the world. Next to the United States the southern Russia–southwestern Siberia-Caucasus field is the richest in the world; this is largely under Russian control although some of the deposits have been given out in concessions to foreign companies.

The United States produces more oil and uses more oil than any other country, regularly furnishing about three-fifths of the world production. The result is that this country in 1921 possessed only 64 per cent of its original supply, of about nine billion barrels, while the rest of the world has preserved over 90 per cent of its original supply of 56 billion barrels. If the United States would produce only 450 million barrels a year it would find its supply exhausted by 1941 or thereabouts.

By developing the oil shale fields of the United States the exhaustion of our petroleum supply may be pushed centuries in the future. Kentucky possesses shale which would yield around 50 billion barrels. of oil; Colorado shale would yield another 80 billion barrels. These two states have tied up in shale deposits more than thirteen times the supply of oil that can be gotten from our own wells by the present known methods. Oregon, Nevada, Utah, Wyoming, Indiana, and Ohio all possess great beds of oil shale.

One of the possible sources of future power is the heat that the sun pours down on the earth. What is needed is to learn to harness it effectively. Between the equator and latitudes 45 degrees north and south this heat amounts to 8,000 foot-pounds per minute for each

square foot exposed to the perpendicular rays of the sun. If this could be converted into mechanical energy it would amount to one horsepower for each square foot of heating surface—more power than is now used from all our coal, waterfalls, and oil wells combined.

Another source of power that may be drawn upon in the future is vegetation. Our early steam engines and locomotives got power from vegetation by burning wood under the boilers. It is not necessary, however, to burn vegetation directly under steam boilers to get power from it, for a wide variety of vegetable substances can be made to yield alcohol by distillation, and alcohol can be used in internal combustion engines much as gasoline is now used. Germany makes considerable use of alcohol derived from potatoes. Fuel alcohol is also made in Cuba from sugar cane at a cost not far from that of gasoline. Experiments also show that vegetable oils may be used with success in the Diesel engine, the results being almost as good as when petroleum is used. Since many of these oils are tropical products it may be that in the future such oils may be produced for power purposes in places that are unfitted by climate for any other use. Perhaps some day the alcohol tanker and the cocoanut-oil tanker will be as common on the sea as the petroleum tanker is today.

Another tremendous source of energy that we have never learned to tap successfully is the heat latent in the earth. In Italy they have even planned to tap the volcano Vesuvius for power. More regular power could possibly be secured by boring into the earth. Such great depth would be necessary to get any great amount of energy, however, that it cannot be seen how this method would produce results at all justifying the cost in time and money. On the whole it promises little as a solution of the power problem in the future.

Still another source of power is the ebb and flow of the tides of the oceans. The simplest form in which tidal power might be harnessed would be to let the incoming tide flow into a kind of reservoir so that when the tide would go out the water could be allowed to run away over an artificial falls to produce electricity; storage batteries might be used to furnish current when the tide was coming in. A double system of turbines, one operating on the inflow and one on the outflow might be used to secure continuous production. The only places where tidal power could be harnessed at all economically would be where the

tide rises to comparatively high levels and where only relatively short walls would be necessary to cut off the tidal basin or reservoir from the sea. The Bay of Fundy in North America, for example, is practically a land-locked basin 400 square miles in area and having a tidal range of 40 feet; the headlands at the outlet are but 3 miles apart and through this narrow gateway it is estimated that over 100,000,000 horsepower of energy runs to waste every day.

One of the most interesting of all power possibilities is to be found in the speculation of modern scientists about the atom. Each of these atoms is thought to consist of a core of energy around which revolve tiny electrical charges. It is thought that some day it may be possible to break up the atom and release the energy which now holds it together and then harness that to do useful work. Perhaps it is only a dream.

See also:
"An Index of Energy Consumption," page 500.
"Power Developments in the United States," page 502.
"The Water Power Situation," page 516.

CHAPTER III

THE NON-PHYSICAL CULTURAL BACKGROUND

Purposes of this chapter:

1. To see how true it is that our producing activities are largely shaped by our cultural background. (In this chapter the non-physical cultural background is considered.)
2. To get an understanding of the more significant elements of the non-physical cultural background which condition production.
3. To reflect that the future of production rests in large part upon the future of our non-material culture.

What is man the producer? Beyond question, man is what he is partly as a matter of biological inheritance. His physical qualities and characteristics are thus to be explained, and many competent observers hold that a goodly share of his moral and mental characteristics are also thus to be explained. But, equally beyond question, man is what he is partly as a matter of social inheritance. The biological base is shaped by the culture in which it exists—getting as culture elements language, attitudes of mind, mental habits, and the countless other features that we have come to regard as distinctively human. For our present purposes we do not need to strike a nice balance with respect to the relative importance of physical heredity upon the one hand and social inheritance upon the other hand as determinants of man's qualities and attainments. It is sufficient for our purposes that we recognize that each is of great importance.

Although it is not worth while to enter upon the long and learned—and largely futile—dispute as to whether man "owes more" to biological considerations or to cultural considerations, it is appropriate to say this much: As best our experts can judge, man has changed little or not at all biologically in the last 500,000 years or more, whereas he has in that same period of time made tremendous changes in his culture. In our study of man's productive activities we may therefore regard the biological base as a fixed or given datum; and we may

properly give the major part of our attention to a study of the element which has possibility of change. In this element lies future developments in production.

As regards man's culture, it will facilitate discussion if we differentiate in our treatment the *physical* cultural background (illustrated by houses, tools, and all the other tangible or material impedimenta of civilization) from the *non-physical* cultural background (illustrated by the world of ideas, habits, and social institutions). It will be realized, of course, that this differentiation is arbitrary and unreal, being justified only as it may facilitate discussion. For example, it is clear that houses and tools have little or no significance except in terms of the ideas and habits associated with them; and many ideas and habits exert their influence in production through physical agencies.

The relationship of the non-physical cultural background to production is treated in this present chapter; the relationship of the physical cultural background to production is discussed in the following chapter.

A. The Origin and Meaning of Culture

It is easy to sense the significance of culture; it is difficult to state in any brief and precise way its content. If we assume that primitive man was biologically and in native capacities our equal, then the difference between his living and ours bears witness to the significance of changes in culture. But what is culture? Various answers have been given; that of Wissler serves our purpose well. As he sees the matter, the culture pattern is made up of a number of trait complexes such as the communicating system, material traits, art, mythology and scientific knowledge, religion, social systems, property, government, and war. Under these nine headings, as greatly elaborated as one wills, can be tabulated all the facts of any given culture and of all cultures. "Here is the human pattern."

In chapter iii of Part I (pp. 245–68) we saw something of the ways by which culture is conserved, selected, accumulated, and transmitted; and in particular we saw the functions of invention and diffusion in cultural change. With this as a background, it should greatly influence our understanding of production as it takes place in the modern order, if we should secure a working knowledge of the main currents which have shaped our culture—assuming as a starting point

the culture of Neolithic man. That is the main purpose of the present section.

No one should have any doubt that culture does profoundly influence our economic activities. Suppose that all of us now living in the countries of Western civilization should suddenly disappear, leaving behind us all the material trappings of our culture. Suppose that at the next instant our places were taken by untutored Neolithic savages. The producing activities of these savages would be quite different from the producing activities with which we are familiar.

The ideology of these savages would not enable them to operate as we operate today. As regards material equipment, to take only one illustration, the probabilities are that many kinds of existing equipment would disappear through the slow process of deterioration and decay, without these savages being able to learn how to make use of them. The whole mental outlook of these savages would be such that they could not make the same use of our physical equipment that we make.

This illustration indicates how important the ideology of the group is in determining the character of its producing activities. In addition to what are usually called skills, techniques, and knowledges, other institutional aspects of the life of the group, the co-operative or non-co-operative attitudes of its members, the rules of the game under which the members operate, and many other similar considerations affect the way social energy is used in production.

As Western civilization has developed, certain attitudes of mind have grown up, certain practices have become customary, certain patterns of acting and thinking have congealed into institutions. Some of these attitudes, customs, and institutions are fundamental in the sense that they condition the whole range of our economic activities. A list of these fundamental matters would include private property, freedom of contract, individual initiative, competition, and various other forms of social control, such as custom, public opinion, religion, moral attitudes, law, and government.

In the readings of this section two issues are stressed:

1. What is culture?
2. How has Western civilization been shaped?

and a third should ever be in the mind of the reader:

3. In what particulars can culture be shown to shape the productive process?

1. THE CONTENT OF CULTURE[1]

Students of cultures find that the same general outline will fit all of them; thus, we say the facts of culture may be comprehended under nine heads as in the accompanying table; viz., Speech, Material Traits, Art, Mythology, Religion, Social Systems, Property, Government, and War. This outline can be greatly elaborated, if the reader gives his constructive imagination full play. It is, however, full enough for our purposes.

Now, if we take up our own culture and fit the details into this scheme, we see how readily they fall under these heads. So do the old cultures of Rome, Greece, etc. On the other hand, there are lowly, simple, crude peoples, like the Australians, who are said to have no culture. If we take literally many of the statements made by contemptuous writers on the subject, this would end the matter; but the facts are otherwise, for turning to the literature of the subject and taking first the main headings in our outline, we find all represented in the supposedly simple life of the Australian. Thus, even among very primitive peoples there are cultures which readily fall under the heads enumerated above.

We see that not only are the historic cultures, from the most primitive to our own, built upon one general pattern, but in some instances the materials are identical. And we now know that the same is true of the late paleolithic cultures, for they had fire, chipped stones, drew remarkable pictures, modeled in clay, and buried with their dead objects for the future use of the spirit. Incomplete though this picture of their life must remain, we may be sure that since it fits our one pattern at so many points, it will at the others as well. It is true that the skeleton of culture we have offered is a generalized one and so not a stern reality, and yet, it is as real as the osseous skeletal pattern for man as a whole—both abstract generalizations based upon objective data. Further, no one denies that this bodily pattern is part of a more comprehensive pattern for mammals as a whole; and in just the same way, one must admit that the culture pattern expresses the fundamental lines of the evolution of the phenomenon itself.

Now we have, as it were, set up a few categories which, taken together, seem to cover the entire range of culture content. Thus, under

[1] Adapted from C. Wissler, *Man and Culture*, pp. 74–78. (New York: Thomas Y. Crowell Co., 1923.)

speech we may include language, sign-talk, gesture, and all forms of writing, and so far as we now see, something under this category will be found in every culture. Yet the several tribal cultures will differ in kinds and number of trait-complexes falling under this head. If we turn to art, the facts are similar, and so on through the series. The pattern we have sketched here is the human pattern.

THE CULTURE SCHEME

1. Speech
   Languages, writing systems, etc.
2. Material traits
   a. Food habits
   b. Shelter
   c. Transportation and travel
   d. Dress
   e. Utensils, tools, etc.
   f. Weapons
   g. Occupations and industries
3. Art, carving, painting, drawing, music, etc.
4. Mythology and scientific knowledge
5. Religious practices
   a. Ritualistic forms
   b. Treatment of the sick
   c. Treatment of the dead
6. Family and social systems
   a. The forms of marriage
   b. Methods of reckoning relationship
   c. Inheritance
   d. Social control
   e. Sports and games
7. Property
   a. Real and personal
   b. Standards of value and exchange
   c. Trade
8. Government
   a. Political forms
   b. Judicial and legal procedures.
9. War

See also:
"The Economic Organization of Primitive Man," page 44.
"The Meaning of Human Evolution," page 266.
"Conscious and Unconscious Social Control," page 423.

2. THE SHAPING OF WESTERN CIVILIZATION[2]

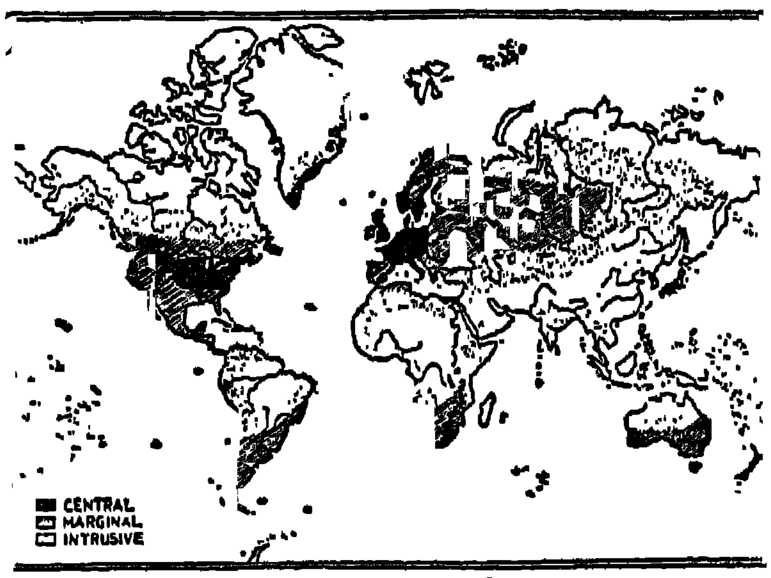
Four great cultures form the basis of western civilization.[3]—We have learned that a group is a body of persons who think and act alike—who have common interests; who have much the same ideals and aspirations. Now, in some real sense the peoples of western civilization, the peoples of our own Euro-American culture, constitute a group; unlike as they are in some ways, they are far more alike than different. The basic customs, the ways of thinking and acting, the

[2] Marshall, *The Story of Human Progress*, 408–15. By permission of the Macmillan Company, publishers (1925).

[3] Cf. Ellwood, *Social Problems.*

methods of harnessing nature, the methods of communication, the scheme of social organization, the ideals and aspirations of all these peoples are really much the same. For this there is a very simple reason: Very much the same influences have shaped or formed the living of all these peoples down through thousands of years.[4]

The Euro-American-culture group got its first great shaping as the result of the mixing and blending of four cultures: those of the Greeks, the Romans, the Jews, and the Teutonic tribes.



Courtesy of Wissler: *Man and Culture* (Thomas Y. Crowell Company)

AREAS OF EURO-AMERICAN CULTURE

The heaviness of the shading is proportional to the extent of the influence of Euro-American Culture.

As for the contributions of Greece, here, two thousand years ago, there lived a people who had developed, through still earlier thousands of years, certain customs, habits of thinking, social institutions, ideals and aspirations. They thought and acted in certain ways; they were a culture group.

There were, of course, many aspects of their culture, certain aspects being especially important for our present study. In the first place, the Greeks loved the artistic and the beautiful, so that art flourished among them in such forms as sculpture, architecture, music, and literature. In the second place, they became bold and independent thinkers. Aristotle's motto, "First of all, let's get facts," shows how their minds worked and helps explain the development of science among them. They were, without any doubt, a wonderful people. Although they held the center of history's stage for only a few hundred years, they made great contributions to human progress. "The world beautified and enlightened" is a short way of describing their contribution.

The second influence to mention is that of Roman life and civilization. These Romans, as they lived two thousand years ago, had also

[4] Robinson, *The Mind in the Making,* speaks of four historical layers underlying the minds of civilized men: the animal mind, the child mind, the savage mind, and the traditional (largely medieval) civilized mind.

developed, through still earlier thousands of years, certain customs, habits of thinking, social institutions, ideals and aspirations. They too were a culture group.

The aspects of their culture most important for present purposes are those which made them conquerors, rulers, engineers, and organizers. Their armies conquered and brought under one rule the greater part of the world known at that time. Their great roads and aqueducts and buildings were quite remarkable, when one remembers how poor the Romans were in capital goods as compared with us. Their systems of law and government were so good that in many ways they still serve as patterns.

The words, "conquerors, rulers, engineers, and organizers" prepare one to think of these Romans as a rather selfish lot who were quite willing to use brute force to get what they wanted. That is true. But they did conquer most of the European area, and they did build up a tradition of the nation, of law, of government, and of order. Although they conquered Greece, they were themselves conquered by the Greek culture and they carried it into their subject territories. But their own contributions were mainly in the realm of law and government. "The world organized and ruled," is a short way of describing their contribution.

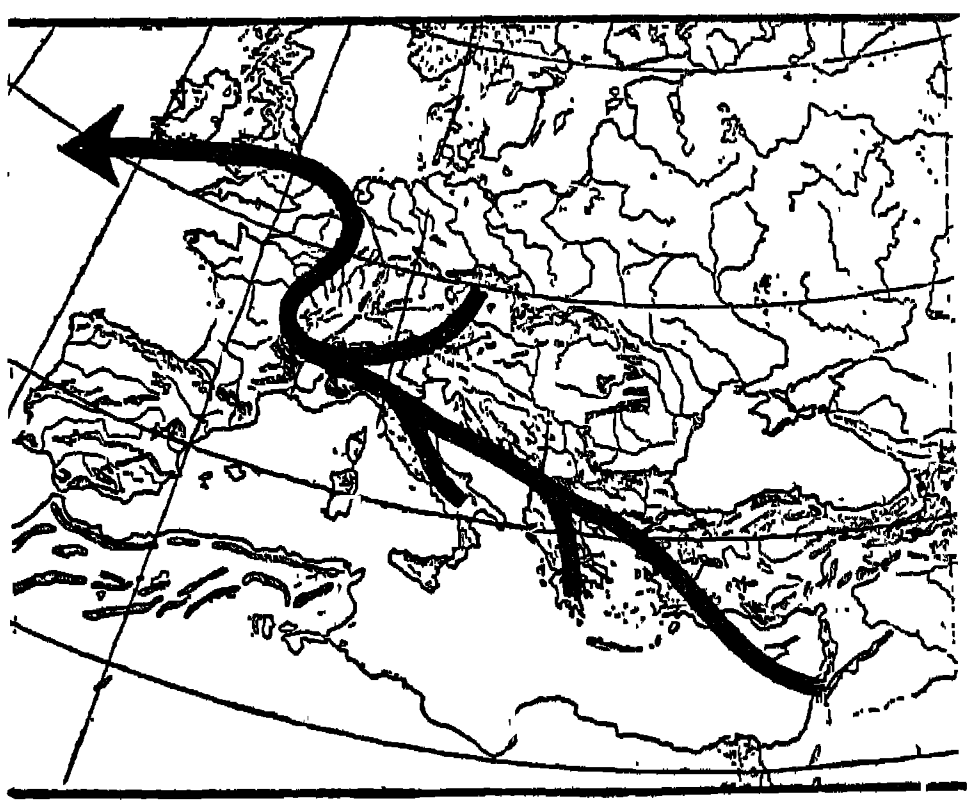
In Palestine two thousand years ago, there lived the third group, who, through still earlier thousands of years, had developed certain customs, habits of thinking, social institutions, ideals and aspirations.

In particular, they placed great emphasis upon the family and upon a form of religion full of ideas and phrases taken over from their family life. God was thought of as a father; all men were children of God and were, therefore, brothers. "Faith," "hope," "love," "righteousness," "justice," "service" are examples of the words that rose most frequently to their lips. This Jewish faith was modified and made more vital by the teachings of Jesus. In the form of the Christian religion, it spread to the Roman empire, and in the fourth century it became the official religion of the Romans. This meant that its teachings were carried through much of Europe. "The world a brotherhood" was the great central thought of those teachings.

The fourth great influence came from the Teutonic tribes. Two thousand years ago these warlike tribes lived in the gloomy forests of

north-central Europe. As was true of the other three groups, they had developed, through still earlier thousands of years, certain customs, habits of thinking, social institutions, ideals and aspirations.

These Teutonic tribes were fierce barbarians, much given to raiding and pillage. One branch of their descendants, for example, were the Vikings, who boasted that they were "sea-wolves" and lived up to the name by sudden dashing raids upon defenseless people. But with all their fierce plundering and burning and murdering, these Teutons made one great contribution. For various reasons, they developed a way of handling their affairs by little public meetings (folk moots, or meetings of the folk) in which every freeman could say his say and play his part. We have come to think of these folk moots as a "cradle of democracy and individual initiative."



THE FOUR STREAMS OF EUROPEAN CULTURE SPREAD TO THE NEW WORLD

As time went on, some of these tribes were conquered by the Romans. Later, however, the Roman Empire weakened, and new hordes of these barbarians swept down from the north. They took Rome itself in 476 A.D., and from that time on they were the ruling forces in Europe. Although they were thus the conquerors of Rome, they were themselves gradually taken captive to some extent by the civilization they crushed. In particular, they came to accept the Christian faith.

Within the last two thousand years there have occurred a mixing and fusing of these four great cultures. We often speak of our country as the "melting pot" because we are a sort of huge pot or cauldron into which, in the last hundred years, tens of millions of immigrants (mainly from the countries of Europe) have poured. But what a melting pot there was in Europe fifteen hundred to two thousand years ago! Into that cauldron went Greek art and science, Roman law and

government, Jewish religion and morality, Teutonic democracy and liberty. Into it went also liberal doses of selfishness, brutality, cruelty, piracy, ignorance, superstition, and trickery. It is not surprising that these elements did not always mix well; that the cauldron seethed and sputtered for centuries, and, indeed, is still doing so. Our civilization has strange streaks in it. As just one example of many, are we not sometimes Christians and sometimes sea wolves in our business dealings?

Later forces have helped to shape the product of those four great cultures.—At least three great forces have affected this European melting pot since the time when the four great cultures were poured into it. The first emphasized and developed the ideals of the warrior class; the second, those of the business class; the third, ideals of individual freedom.

Among all peoples who have enlarged the gens into a tribe or into a state by war and fighting, there has arisen a warrior class[5] that has, for the time, practically run the affairs of such peoples. Naturally, the members of this warrior class come to think and act in much the same way, and in time they develop standards, ideals and aspirations.

The Europe that resulted from the barbarian conquests was at first a chaos of fighting and plundering. Gradually, however, there arose strong leaders of bands of warriors and gradually there arose nations whose monarchs ruled (in a more or less effective way) these leaders and their warrior bands in the feudal system. These fighting men were, upon the whole, a cruel lot who scorned their "inferiors" and treated them harshly. But they did have within their own group fine ideas of *courage* and *honor* and *loyalty*. The warrior must be loyal to his lord, even unto death if need be. He must protect the weak (of his own class), be generous, fight fairly, help damsels in distress, be brave, be a man of honor, be dignified, keep his word, and in general, "be a gentleman." Gradually these standards were imitated by the "lower classes" and became the ideals of the ordinary man. The current phrase "be a gentleman!" reflects this situation.

As the warrior class was rising to its greatest power, there began to be noticeable in the medieval towns, the beginnings of trade and industry. In time the towns had a class of manufacturers and traders

[5] Cf. Tufts, *The Real Business of Living.*

who, scorned by the warrior class, went about their work and came to have more and more influence.

As is true of any group, these medieval manufacturers and traders got to thinking and acting alike. At first they were a tricky, cheating, unscrupulous lot (as some business men are to-day), but gradually it came to be seen that such ways were not "right" and workable, and better standards and ideals arose. Since the towns were usually free (not ruled by the warriors), these "middle class" persons did not look up to and imitate the warriors. Instead they gradually developed ideals of square dealing, good measure, good workmanship, dignity of labor, honesty, trustworthiness, fairness, and thrift. And these ideals persist to-day.

Although the Teutonic tribes were great believers in the individual, several things had to happen before there could be the kind of individual initiative and democracy that exists to-day. Men had to be made (1) free in their thinking, including their religious beliefs, (2) free from rule by lords and masters, and (3) free to act on their own initiative in business.

It was no easy matter to get men *free in their thinking,* for their minds were held in the cake of custom. Through the Dark Ages the shining example of Greek freedom of thought was almost lost. But between 1100 and 1500 a great awakening, a religious reformation, the printing press, and geographical discoveries shook men's minds a bit free from custom. During the last one hundred and fifty years scientific thinking has greatly increased. Man is becoming able to think —to be free in his thinking.

The growth of the ideal of *civil and political freedom* was a slow growth. To-day, however, it is an ideal of more than ninety per cent of the peoples of Western civilization.

The ideal of *freedom of individual initiative* in business has also been a slow development. In the days of the medieval warrior class, their tenants in the vills or manors had little freedom in business. Most of them could not even leave the manor. All of them carried on their work in old customary ways. In the towns, the small manufacturers and tradesmen had more freedom, but even their actions were closely regulated by the "guilds," or associations, that they formed. Later, when the nation became strong and the guilds had weakened,

the nation kept up all sorts of petty restraints on the actions of business men.

Gradually, however, this was changed. Markets became wider and wider, thanks to discoveries and colonization. Society became more and more a "money society" that relied upon competition and the gain spirit. It came to be felt that society would fare better if it allowed business men more freedom to conduct their affairs as they chose, providing they did not choose to harm others. In general terms, business men to-day can go where they choose, make what they please, form such contracts as seem to them good, make what profits they can, subject only to a general supervision by society. The ideal of individual initiative in business has become generally accepted.

The significant fact found in the foregoing sketch of the forces which have affected our ideals is this: Ideals and aspirations grow and develop just as truly as does knowledge, or invention, or a social institution. We are not born with our ideals all packed away in us any more than we are born able to speak a language. So, also, the human race did not start out with a fixed and unchanging batch of ideals. It started with a meagre stock. It added to its stock, changed it, and subtracted from it as time went on.

See also:
"The Development of Individualism," page 231.
"The Processes of Social Change," page 256.

B. Skills, Techniques, Knowledge—Especially Science

Even the simple producing activities of primitive man depended upon certain bits of knowledge and technique; in our modern economic order we have but extended and improved this fund of basic ideas and skills. In picking berries from a bush, or in digging clams, knowledge of where and how to proceed and skill in performance are fundamentally important, just as they are in flying aeroplanes, curing disease, or co-ordinating the divisions of a business. All producing activity in any economic order is conditioned by the existing state of knowledge and by the perfection of available techniques.

It is not merely the specialized information and habits of particu-

lar occupations or tasks that constitute an important productive element, but in addition, the whole range of ideas and procedures which make a civilization what it is. Producing operations are determined in no small measure by man's development of language—spoken, written, and printed—by the existing knowledge of human nature, or by the conduct of educational and religious affairs. One must know where and how to pick berries, but he should know, too, whether they are forbidden by the gods, or are the property of another person. The general background is no less significant than the specialized equipment in determining the nature of economic producing activities.

Knowledge and skill accumulate and refine themselves generation after generation. Through written and spoken language, through the instruction of offspring by parents, and through a vast array of other social pressures and examples—often informal and unnoticed—the new generation receives the intellectual store heaped up from the past. Here and there an innovation occurs; it proves useful and is added to the heritage that passes on, or it is found wanting and is dropped by the wayside. This inventing and accumulating process is subject to spurts and periods of retardation. We appear to be in the midst of an epoch probably unprecedented in the speed with which the heaping-up process is occurring.

In our modern world the building up of new knowledge and new ways of doing things has become a recognized goal which is to be approached by a consciously formulated procedure, the so-called "scientific method." "Scientific method" refers simply to a particularly sound and rigorous procedure in finding answers to problems. It differs from ordinary sound reasoning only in that it provides a more explicit and formal statement of the factual grounds for its conclusions—that is, it insists on standardized and tested solutions to problems. The necessity for tested solutions leads to great emphasis on careful observation, on the painstaking collection of facts, and on the development and use of exact methods of measurement and calculation.

The significance of the method is obvious: it provides answers that *work,* solutions that are certain to be sound because they have been demonstrated to be in accord with the facts observed. Scientific knowledge is tested, measured, exact knowledge. Furthermore, since

it tends to be stated as a law or principle, it commonly has a wide range of application instead of the limited range characteristic of rule-of-thumb knowledge. It is this quality of scientific knowledge which justifies calling it a "multiplier" of man's powers.

The influence upon present-day producing activities of the scientific spirit and its products cannot easily be exaggerated. Industry and commerce are virtually built upon a foundation of scientific discoveries in the fields of mathematics, earth science, physics, chemistry, and biology; and today the social sciences are increasingly coming into use.

But it would be a great mistake to think of all applied knowledge and technology as the creations of science. Rule-of-thumb practices and unscientifically accepted conclusions play a tremendously important part now, as in the past, in determining the nature of productive activities. Industrial procedure is in many instances far in advance of scientific formulations. We may still legitimately speak of the industrial "arts," with all that that term implies as to special knacks and unstandardized creativeness. In agriculture or medicine, or even modern factory operation, with all their scientific procedures, it still is true that much of the activity is directed by "hunches," custom, and unsupported opinion. In matters involving the control of man himself—the human factor in production—this lack of scientific foundation is especially striking.

Whatever be the present limits of science in production, however, the outstanding fact is that the attitude, method, and power of control which science represents constitute one of the most distinctive characteristics of our age.

While there is no denying the practical achievements of science, there are those who seriously question whether science—in the sense of natural science—has not been running away with us; whether we have not become so concerned with advancing our control of the physical world that we no longer ask what we want to control it for. It has been suggested that the stupendous development of material civilization may be an interference rather than an aid to the living of fuller, richer lives for most human beings. This line of thinking has been used with special vigor as an argument for the necessity of developing the social sciences—the study of man and his needs and adaptations—

in a way that will keep pace with the progress of the non-humanistic sciences. How far the scientific study of man may carry us only the future can reveal. The barest beginning has thus far been made.

The foregoing discussion has indicated that science owes much to measuring, evaluating, and calculating techniques. These techniques have, however, a far wider range of usefulness in our society. It is evident, upon reflection, that the diverse elements of a specialized society cannot be co-ordinated unless these techniques are present. When the specialized society is one of individual initiative guided by the gain spirit—as is true of ours—the importance of such techniques is very great indeed.

As would naturally be supposed, our measuring, evaluating, and calculating techniques, such as our arabic numerals, our systems of weights and measures, or our device called money, reach far back in human history and are in the main traditional, non-scientific. In recent generations, however, we have become increasingly aware of the importance of *standards* in such matters, and much scientific thought is today being expended in improving and sharpening these techniques.

The readings in this section will be more meaningful if the following issues[6] are kept in mind:

1. In what ways have our skills, techniques, and knowledge been developed?
2. Precisely what is the significance of science in the productive process?
3. What are the chief manifestations and the significance of measuring and calculating devices in the productive process?
4. As best one can judge, what is to be the future of the productive process, as far as its dependence upon skills, techniques, and knowledge is concerned?

1. A SKETCH OF THE DEVELOPMENT OF SCIENCE[7]

Of course no single cause accounts for the difference between the modern economic order as it exists in the countries of Western civilization and the various economic orders of earlier times. Many, many

[6] A more detailed statement of issues may be found in *Outlines of the Economic Order*, pp. 67–71; 94–95. (University of Chicago Press.)

[7] Adapted from L. C. Marshall, *The Story of Human Progress* (trade edition), pp. 123–31. By permission of The Macmillan Company, publishers (1928).

factors enter into human development. But if one were pressed to name the most strikingly significant cause of the modern economic order, it is quite probable that he would say "the development of scientific knowledge." How did man become a scientist and what has that fact meant for his economic activities and his economic organization?

No one can say when man began to heap up the knowledge that was to become the science of to-day. Presumably the process began far back in the dim past. The trial and error stage, we know, is found even among animals. Cats and dogs and other pets learn to push doors open by the trial and error method; mice or birds or monkeys use the same method to get at food which had been put in a place hard for them to reach. Of course, early man could do as much.

Indeed, man had great advantages over animals in such work. He had a better mind and could think things out. He had a better memory and could store up in his mind the "ways that worked." He could learn that it was not worth while to repeat the ways that did not work. Then, too, the fact that he was a communicator enabled him to pass down to later generations knowledge of ways that worked. The result was that, as the centuries rolled on, a modest fund of knowledge was built up.

But there is a great difference between mere knowledge and science. Science is knowledge, but it is knowledge plus. "Science is exact, regular, arranged, classified knowledge." It is knowledge that has been carefully tested and measured and then put into the form of a general law. The savage knew a great many practical facts about stones and climate and food plants and animals. He had practical rules of thumb about making tools, raising foods, and many other matters. But he was thousands and thousands of years away from having general, scientific laws.

There could be no science until men had become able to tabulate, calculate, and measure.—It is readily seen why early man had such poor success in making general explanation of a sort that would to-day be dignified by the term scientific. Since science is exact, regular, arranged, and classified knowledge, it follows that man had to become able to measure, to count, and to classify before he could have scientific knowledge. Presumably hundreds of thousands of years went by

before earliest man could measure or count at all. Then other thousands of years went by before he became an orderly, systematic counter and measurer. Still other thousands of years went by before he became able to make general rules or laws of science.

There is every reason to believe that when man started to count,[8] he counted "on his body," and the race has counted by fives and tens since the time of the savage days when fingers and toes were thus used. Among the Tamanacs of the Orinoco the word five means "whole hand"; six is "one of the other hand"; ten is "both hands"; fifteen is "whole foot"; twenty is "one man"; and so on. As for our numbers, the Roman numerals I, II, III, etc., have come down from the days of picture writing, when a mark meant "one"—perhaps one finger.

As for keeping track of counting, the very words used show how it was done, for our word "calculate" comes from a Latin word meaning "pebble"; in early days people "calculated" by putting pebbles in heaps as counters. The Chinese abacus, or counting board, is just a device for keeping track, in separate columns, of the number of pebbles that have been set aside for units, tens, hundreds, and so on. Arabic numbers are merely another way of doing the same thing.

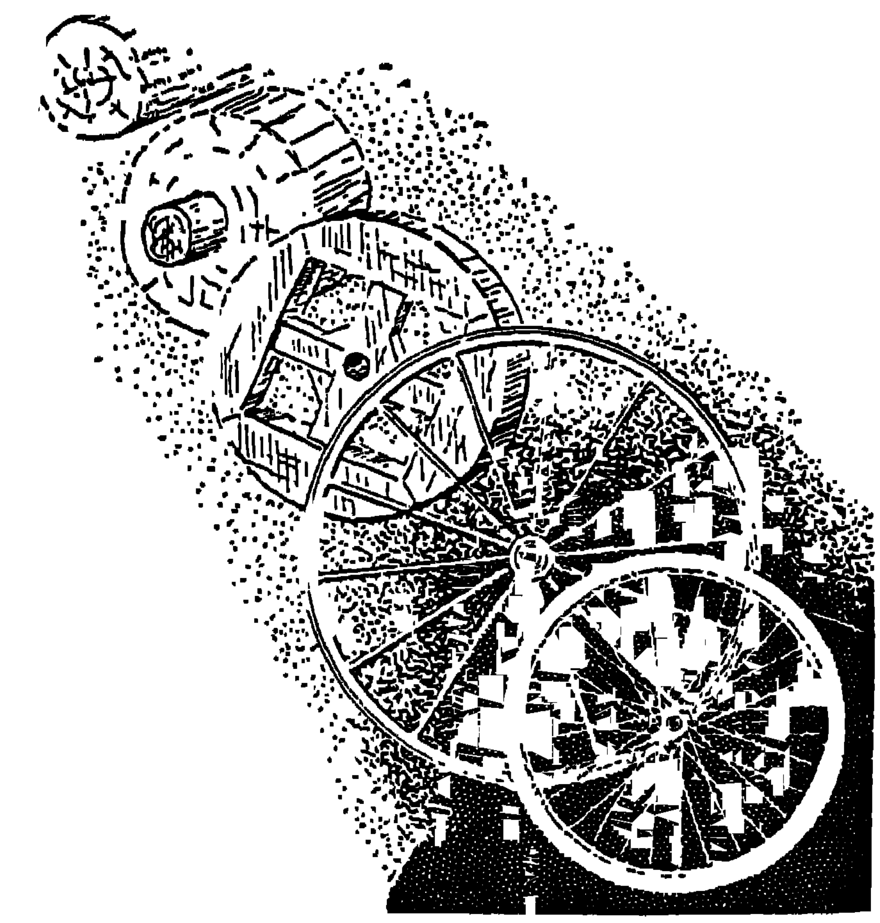
Precisely the same kind of story can be told of measuring devices. Man first measured, as he first counted, on his own body. He began to measure by putting his hands or feet alongside objects. From those days there have come down to us such words as "foot," "hand," "span," or "mile" (from the Latin *mille passus,* meaning "thousand paces"). The time came finally when people (the Egyptians and Babylonians were among the earliest) made pieces of wood or metal of exact lengths to serve as *standards.* From that time measuring devices did not vary according to the size of the man who did the measuring. As time went on, standards were fixed for other kinds of measuring, such as weight and volume.

To-day, the governments of all civilized peoples set such standards by law. Our own government maintains at Washington a Bureau of Standards whose employees are constantly studying and working on measurements and standards. In the vaults of this bureau are kept the standard copies of the metre, kilogram, yard, pound, etc. Here are kept measuring devices that are little short of marvelous: a balance that will weigh within one-two-hundred-millionth part of its load; cal-

[8] This is based largely on Tylor, *Anthropology.* (Macmillan & Co., Ltd.)

ipers that will measure to one ten-thousandth of an inch; ohmmeters that will measure electrical resistance from one one-hundred-thousandth of an ohm to 100,000 ohms; interferometers that will detect movement of one five-millionth of an inch; heat measurers of wonderful range and fineness. Year after year ways are found to make finer and finer measurements.

The great development of science has occurred in the last two hundred years.—When man became able to count and measure, he had the mental tools for beginning to make sciences, for he could now observe, measure, record, and arrange knowledge in an exact, orderly fashion. But it was a long, slow process.

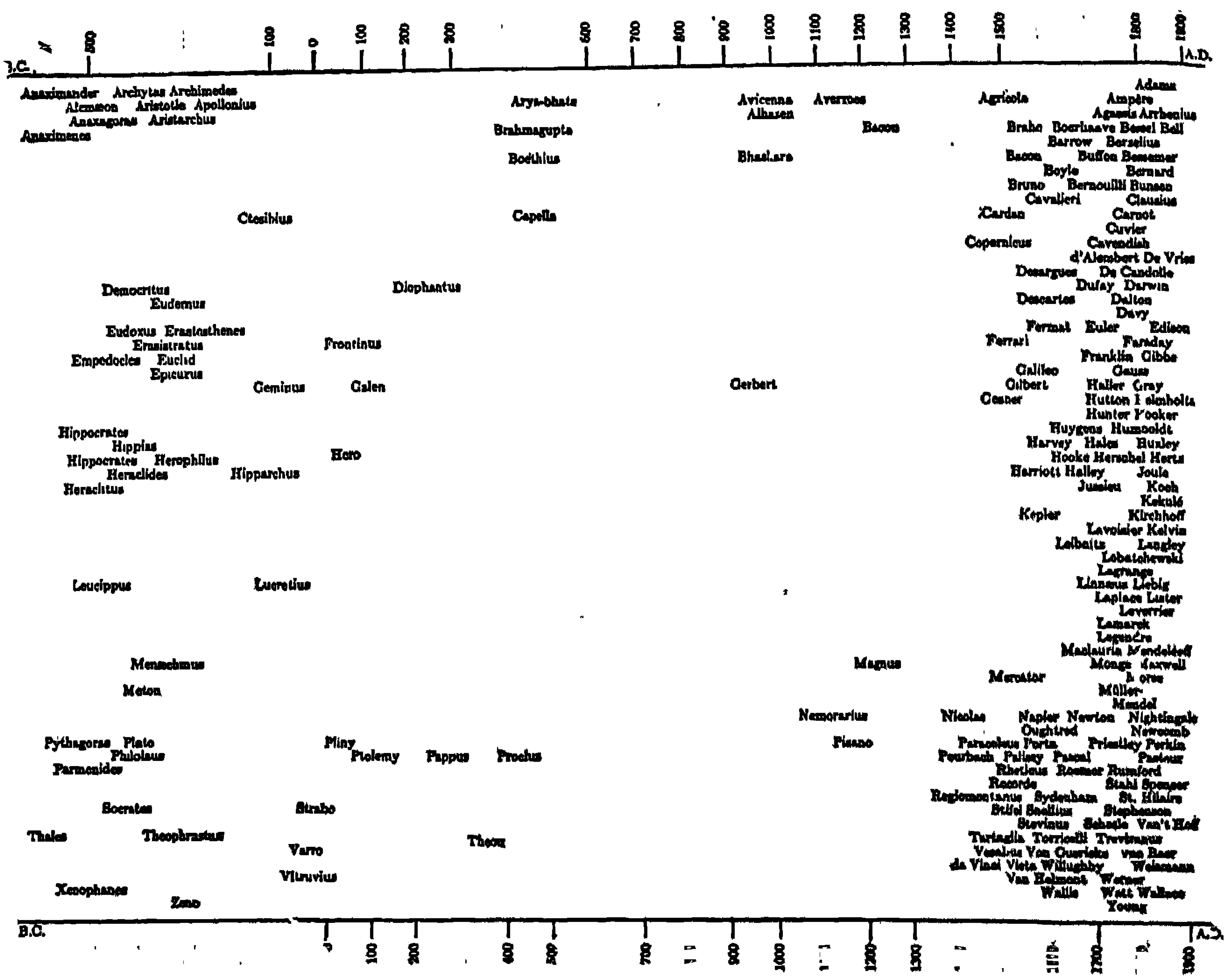


THE EVOLUTION OF THE WHEEL

Here is pictured the development from the log used by a savage to roll his canoe along the beach to the modern wheel with its pneumatic tire. We build upon the progress of the past.

Over four thousand years ago people who lived in Egypt, Assyria, and Babylonia had made much progress in the art of living together. They had good rules of thumb in many fields. Their practical knowledge was far enough advanced for them to have painters, gem cutters, smiths, musicians, shoemakers, tanners, wine makers, sculptors, brickmakers, and many others. These people had, furthermore, so developed their measuring devices that they had a good bit of orderly, arranged, exact knowledge about the movement of the stars and the length of the year and the hour. They knew how to survey and compute areas and volumes (geometry: *geometria* means earth-measurement and may well have sprung up in the Nile Valley where the floods made necessary much surveying every year to re-establish the boundaries). They knew many causes and cures for diseases. Since these ancient far-Eastern people had this measured knowledge, which they expressed in general rules, it is sometimes said that their work marks the birth of science.

These far-Eastern peoples did not carry their science very far. Some writers even refuse to call their knowledge *scientific* knowledge. It happened, however, that their knowledge spread in various ways to the Greeks, who carried it further and certainly gave it a scientific form. Later, it spread to Egypt and to the Hindus and Arabs, who



A ROLL OF HONOR OF SCIENTISTS

This chart shows that the Greeks made their greatest contributions 600–300 B.C.; then come some Hindu, Alexandrian, and Roman names. The chart is blank for about 300 years. Then comes a rebirth of learning, but there are not many names for another 500 years. The last 200 years mark the great outburst of scientific knowledge.

played their part in its development. Then followed a period of very slow progress—a period of decline, even—a period of "the dark ages." A "rebirth of learning," or Renaissance, or Great Awakening, took place in the thirteenth, fourteenth, and fifteenth centuries.

The main outline of the things that happened about the time of this rebirth of learning is a matter of common knowledge. Man rediscovered that the earth was round (the Greeks, Alexandrians, and Arabs knew it long before), and Columbus discovered America. Co-

pernicus (and Galileo with his telescope) demonstrated that the earth is not the center of the universe but that the earth and other planets

ONE CENTURY COMPARED WITH ALL PRECEDING CENTURIES[9]

Some steps in progress in the nineteenth century

1. Railways
2. Steamships
3. Electric telegraphs
4. Telephone
5. Matches
6. Gas illumination
7. Electric lighting
8. Photography
9. The phonograph
10. X-rays
11. Spectrum analysis
12. Anæsthetics
13. Antiseptic surgery
14. Principle of conservation of energy established
15. Molecular theory of gases
16. Velocity of light directly measured and earth's rotation experimentally shown
17. The discovery of the uses of dust
18. Chemistry, definite proportions
19. Meteors and the meteoric theory
20. The proof of glacial epochs
21. The proof of the antiquity of man
22. Organic evolution established
23. Cell theory and embryology
24. Germ theory of disease

Some steps in progress in all preceding ages

1. The mariner's compass
2. The steam engine
3. The telescope
4. The barometer and thermometer
5. Printing
6. Arabic numerals
7. Alphabetical writing
8. Modern chemistry founded
9. Electric science founded
10. Gravitation established
11. Kepler's laws on the Motion of Planets
12. The differential calculus
13. The circulation of the blood discovered
14. Light proved to have definite velocity
15. The development of geometry
16. Gunpowder
17. Paper
18. Fire making
19. Tool making
20. Agriculture
21. Domestication of animals
22. Metals and pottery

revolve around the sun and that far, far outside of this "solar system" there are great stretches of other suns and perhaps of other worlds

[9] The chart is adapted by permission from Wallace, *The Wonderful Century*. (New York: Dodd, Mead & Co.)

(Aristarchus, an Alexandrian thought so about 250 B.C.). The mariner's compass, which enabled sailors to go far out at sea without getting lost, and the printing press, which greatly increased man's ability to pass knowledge along to others, date from this period. The most significant gain, however, was in spirit, attitude, and outlook. Men became experimenters; they refused merely to "take another's word for it." They watched, observed, tried things, kept records of their experiments—all with the idea of making knowledge the "exact, regular, and arranged" knowledge that is science.

This sketch of the history of science is reflected in the chart on page 352 which shows the life periods of the great scientists. Although acquired knowledge has been heaped up over a long period of time, yet measured against man's long stay on the earth, science is a very new thing. Once it came into being, there was a long period of slow growth, a period of decline, a rebirth of learning, and a recent great outburst of activity. Since the chart comes down only to 1900 and includes almost no names of living scientists, it does not show that this outburst is still going on. If living scientists were included and the chart were brought down to the present day, its right side would be black with names. Clearly, the large development of science has occurred only in the last two hundred years. Its application in rules of action through our schools of technology is a matter of the last fifty or seventy-five years.

2. FOUR STAGES IN THE DEVELOPMENT OF THE USE OF KNOWLEDGE[10]

When I was a country lad of twelve, the state, as a means of protecting crops, offered a reward of ten cents for each ground-hog scalp turned in at the county courthouse. My father gave me a .22 rifle and told me that I could keep any money I got from ground-hog scalps. This was a task to a boy's liking. It is not surprising that I became a good marksman.

One day, while walking along a river which flowed through the farm, I saw some fish swimming. At that time the shooting of fish was not forbidden by the game laws of the state, so I tried my skill. I

[10] Adapted from Marshall, *The Story of Human Progress* (trade edition), pp. 110–13. By permission of The Macmillan Company, publishers (1928).

was not able to get a single fish. I tried again and again on succeeding days, using various schemes in my shooting, but I got very few fish. Happening to mention my difficulties to my father, he said, "Of course; you must aim below a fish in the water in order to hit it." When I asked him why, he could give me no reason. He simply said that he knew that it was true, that he had been told that was the way to shoot fish, that he had tried it, and that it worked. I went back to the river with his rule in mind, and, sure enough, it worked.

Quite without knowing it, I had illustrated in my fish shooting two stages, or steps, in the development and use of knowledge. The first stage is the trial-and-error stage which is "a groping after something by trying everything." One tries and tries various things. Some "work," or "are right"; others "do not work," or "are wrong." That was the stage I was in before I talked with my father.

This first stage is followed by a second stage in which one comes to use "rules" based on the ways that "work," without knowing *why* they work. Such rules are called rules of thumb. Perhaps if I had kept at the job of shooting fish I should have stumbled upon the fact that I needed to shoot below them. Others had done so and had passed that rule on to my father. He passed it on to me. But neither of us knew "the why" of it. We merely shot fish by rule of thumb.

A few years later I studied physics at the high school in the neighboring city, and one of my textbooks treated this very problem of shooting fish! In the book the problem was worked out by men of science who had found the "why" of it. Scientists had discovered, after much study and experimentation, that when a ray of light goes on a slant from one body (like the water) to a less dense body (like the air), the ray of light actually bends, or refracts, in the process, so that the fish was really nearer the bank of the stream than it seemed to be. A ray of light going from the fish bends at the surface of the water and goes to the eye of the observer in such a way that the fish seems to be farther away than it really is.

The physics book explained all this. It pointed out that since rays of light act this way, one needed to aim under the place where the fish seemed to be. This was a *rule of action* based on a *scientific law* about the way rays of light perform.

My high-school experience showed stages *three* and *four* in the

development and use of knowledge. The third stage is illustrated by the scientists who study how rays of light act under all sorts of circumstances and conditions. These men are not interested in shooting fish. They are curious about rays of light and eager to know how they act. After much study, experimentation, and measuring, they find that rays of light bend, or refract, certain amounts under certain conditions. They then draw up brief general statements ("laws" of science) about that bending, such as "a ray of light passing from a more dense to a less dense medium is refracted away from the common perpendicular." The word "science" comes from a Latin word which means "to know." Now, the "knowing," or knowledge, of the scientist is not vague. It is knowledge which has been carefully measured and tested and then stated in a general way. In brief, this third stage is that of the discovery and formulation of scientific law.

The fourth stage is that of making rules of action based on scientific law. These differ greatly from the rules of thumb of the second stage. To begin with, rules based on scientific knowledge are more measured and exact and accurate. They are worked out with instruments of precision; hence they give better results. More important still, they are *general* and may therefore be used for many purposes, thus multiplying man's powers. Take light rays. Science gives general statements about them. They *always* act in certain ways under certain conditions. There was nothing peculiar about their action in the fish-shooting case. They act the same way with other bodies. In other words, once it is known how light rays act, rules of action can be formulated not only for shooting fish but for other purposes as well. By way of an example of these other purposes, microscopes and telescopes constructed in accord with the laws of light open up new worlds! Clearly our powers are greatly increased when use is made of laws of science which are general in character.

Here is the field of the engineer.

3. THE ENGINEERING PROFESSION[11]

If the writer may modestly put forward a suggestion for a definition, he would word it: "The Engineer is he who by science and by

[11] Adapted by permission from F. R. Hutton, "The Mechanical Engineer and the Function of the Engineering Society," *Proceedings of the American Society of Mechanical Engineers,* XXIX (1907), 602–12.

art so adapts and applies the physical properties of matter and so controls and directs the forces which act through them as to serve the use and convenience of man, and to advance his economic and material welfare."

In making the following classification of engineers it is obvious that agreement cannot be secured from all as respects the number of branches to be recognized. With this apology and for the purpose in hand there are at least thirteen:

a) The mining engineer and his close ally, the metallurgical engineer, are concerned with the discovery and the winning and extraction from the earth of its buried treasures of oil, fuel, and rock. He touches the geologist and mineralogist on one side of his functions, and the chemist upon the other. Midway he allies himself to the mechanical engineer for the power to overcome his resistances and to the electrical engineer for its convenient transmission to the working point.

b) The electrical engineer is primarily entrusted with the transformation of mechanical or chemical energy into electric form, and its transmission in that form to the point of use, where it will be again converted into some other shape. The electrical engineer has made his own the question generating such electric energy for the solution of the problems of lighting, transportation of passengers by railway, and communication by telegraph and telephone. He touches the physicist in the realm outside his applications of science, and has the mechanical or hydraulic engineer next to him to supply mechanical energy to his generator, and the mechanical engineer beyond him, where his energy drives the tool, or operates the pump or the elevator. Where his energy is made to appear as high heat, he serves the metallurgist, the chemical engineer; where it appears as low heat or as light, he serves the individual members of the community directly, as he does in the problem of communicating speech. His field is very definite.

c) The naval engineer and marine architect is a specialized mechanical and structural engineer. His hull is a truss unsymmetrically loaded and variably supported: his motive power a definite yet widely diversified problem. He covers in addition a wide range of special problems when his vessel is also a clubhouse or hotel, on the one hand, or a powerful fighting machine upon the other.

d) The military engineer must cover both the defensive and the offensive department of his avocation. On the one side he is a structural engineer, and the problems of effective transportation enter his field, which he therefore shares with what is usually called the civil engineer. On the side of attack, the problems of ordnance both for its construction and for its operation take him into the field of the mechanical engineer and electrical engineer, and his problems touch those of the physicist and the chemist and the mathematician on the research and theoretical side.

e) The chemical engineer is a new applicant at the door of professional recognition in certain quarters. He is the engineer in charge of production or manufacture where the process or the product, or both, are chiefly or entirely dependent upon the theories and practice of chemistry. He shares his field with the metallurgical engineer as respects the manufacture of metals; he is a mechanical engineer as soon as the plant becomes large enough to warrant the application of power and machinery to the mechanical handling of his product.

f) The sanitary engineer is a specialist in hydraulic engineering in the applications of water supply and drainage as means to secure the well-being of the community as respects its public health. His co-workers are the bacteriologist and the physician. It would seem more serviceable, however, for the purpose in hand to group such men with what are hereafter to be called the civil engineers.

g) The heating and ventilating engineers, making a specialty of the sanitary requirements of enclosed houses as respects their fresh and tempered air supply, are really sanitary engineers, having, however, an outlook and a relation to mechanical engineering in the appliances of their function rather than toward civil engineering.

h) The refrigerating engineer is concerned with the transformation of mechanical or heat energy so as to lower the amount of such intrinsic energy in any material or space. He is most unassailably a mechanical engineer.

i) The hydraulic engineer is of two groups. The one type, concerned with the problems of the river or canal for navigation or for power with the dam and its accompanying details of waterways and controlling gatehouses and sluices; and with the gravity storage and distribution by mains of the city water supply has plainly his outlook

toward civil engineering. The other type, concerned with the water motor and its attached machinery for its operation, with the mechanical handling of water for city use or for power in industry, the designer of pumps and hydraulic utilization machinery, has his outlook equally definite upon the field of the mechanical engineer.

j) The gas engineer has two sets of problems: The one is the intra-mural manufacture and storage of his product, where his functions are those of the chemical manufacturer, and he should be both chemical and mechanical engineer; the other is the distribution problem for whose solution is required the skill and knowledge of a type which is unnamed, but which, logically in parallel with the hydraulic engineer above, should be called the pneumatic (or gas) engineer.

k) There is no recognized group of engineers of transportation, or transportation engineers. Such a group obviously exists, however, whether or not the name is attached to an organization inclusive of all, or is in general use. Such are the engineers of motive power on the steam railways, with the master mechanics and the signal engineers and the operative class on locomotives; such are the street railway engineers; the car builders; the maintenance-of-way engineers, the bridge engineers, the engineers of floating equipment. From the bottom of the rail upward, these have their outlook on mechanical or electrical engineering; from the bottom of the rail downward upon civil engineering.

l) The foregoing group does not claim to be exhaustive nor inclusive of all subdivisions of engineers even so far as it has gone. The current activities of the Engineering Building reveal bodies of municipal engineers, of illuminating engineers, of engineers concerned in fire protection, and many others. But the purpose has been to clear the way for the separation of the two most closely allied in function and service, the civil and the mechanical engineer.

It is plain that to the civil engineer belong as of right all problems relating to the canal, the lock, the river, the harbor, the dock, the sea-wall, the break-water, the highway, the aqueduct, the bridge, the viaduct, the retaining wall, the permanent way of the railway below the foot of the rail. He also has nearly the whole of the municipal problem in streets, sewage, distribution of water; the location of railways, with geodetic and other surveying, are his. He has the foundation of struc-

tures in any event, but may have to share the roof and the skeleton steel frame with other specializations. Tunneling is usually done by civil engineers, although it was originally a mining engineer's prerogative.

m) To the mechanical engineer, on the other hand, belong as undoubtedly, and as of right, the problems of the generation of power in power houses and power plants, and its transmission to the operative point unless this latter is done by electric means. It is also plain that to the mechanical engineer belong all design, creation, and manufacture of tools and machinery. This makes him therefore the natural administrator or executive of the production processes involving the use of machinery in factories and mills, and it is here that he finds his broadest scope and widest opportunity.

4. MONEY AS A CALCULATING AND MEASURING DEVICE[12]

Some years since, Mademoiselle Zélie, a singer of the Théâtre Lyrique at Paris, made a professional tour round the world, and gave a concert in the Society Islands. In exchange for an air from *Norma* and a few other songs, she was to receive a third part of the receipts. When counted, her share was found to consist of three pigs, twenty-three turkeys, forty-four chickens, five thousand cocoa-nuts, besides considerable quantities of bananas, lemons, and oranges. At the Halle in Paris, as the prima donna remarks in her lively letter, printed by M. Wolowski, this amount of live stock and vegetables might have brought four thousand francs, which would have been good remuneration for five songs. In the Society Islands, however, pieces of money were very scarce; and as Mademoiselle could not consume any considerable portion of the receipts herself, it became necessary in the meantime to feed the pigs and poultry with the fruit.

The first difficulty in barter is to find two persons whose disposable possessions mutually suit each other's wants. There may be many people wanting, and many possessed of those things wanted; but to allow of an act of barter, there must be a double coincidence, which will rarely happen. A hunter having returned from a successful chase has plenty of game, and may want arms and ammunition to renew the chase. But those who have arms may happen to be well supplied with

[12] From W. S. Jevons, *Money and the Mechanism of Exchange*, chap. i.

game, so that no direct exchange is possible. Sellers and purchasers can only be made to fit by the use of some commodity, some *marchandise banale,* as the French call it, which all are willing to receive for a time, so that what is obtained by sale in one case, may be used in purchase in another. This common commodity is called a *medium of exchange,* because it forms a third or intermediate term in all acts of commerce.

A second difficulty arises in barter. At what rate is any exchange to be made? If a certain quantity of beef be given for a certain quantity of corn, and in like manner corn be exchanged for cheese, and cheese for eggs, and eggs for flax, and so on, still the question will arise—How much beef for how much flax, or how much of any one commodity for a given quantity of another? In a state of barter the price-current list would be a most complicated document, for each commodity would have to be quoted in terms of every other commodity, or else complicated rule-of-three sums would become necessary. Between one hundred articles there must exist no less than 4,950 possible ratios of exchange, and all these ratios must be carefully adjusted so as to be consistent with each other, else the acute trader will be able to profit by buying from some and selling to others.

All such trouble is avoided if any one commodity be chosen, and its ratio of exchange with each other commodity be quoted. The chosen commodity becomes a *common denominator* or *common measure of value,* in terms of which we estimate the values of all other goods, so that their values become capable of the most easy comparison.

A third, but it may be a minor, inconvenience of barter arises from the impossibility of dividing many kinds of goods. A store of corn, a bag of gold dust, a carcase of meat, may be portioned out, and more or less may be given in exchange for what is wanted. But the tailor, as we are reminded in several treatises on political economy, may have a coat ready to exchange, but it much exceeds in value the bread which he wishes to get from the baker, or the meat from the butcher. He cannot cut the coat up without destroying the value of his handiwork. It is obvious that he needs some medium of exchange, into which he can temporarily convert the coat, so that he may give a part of its value for bread, and other parts for meat, fuel, and daily necessaries, retaining perhaps a portion for future use.

(A more complete statement of the function of money as a device useful for measurement and calculation is in Part III, chapter i.—Ed.)

5. CALCULATION AND MEASUREMENT THROUGH STATISTICS AND ACCOUNTING[13]

All sorts of business enterprises which are operated for profit depend more or less upon accounting for the control of their operations. This is true alike of farm, mine, factory, fishery, bank, railroad, insurance company, and wholesale or retail store. It makes no difference whether a business enterprise is organized as a partnership, a corporation, a business trust, an individual proprietorship, or some other form of the business unit. It makes no difference whether the persons desiring information are the managers and employees of the enterprise, the stockholders or partners, the financial institutions from which funds are borrowed, the vendors from whom merchandise is purchased, or the government officials who are collecting taxes from the concern. Whatever the form of organization, and whatever the purpose for which precise quantitative information is desired accounting is the device which supplies information as to the various activities of an enterprise: marketing, production, purchasing, personnel, and finance. The information is expressed in such terms as "income from sales," "manufacturing costs," "wages," "interest," "taxes," and "profit."

Non-profit institutions, such as churches, lodges, museums, schools, educational foundations, and hospitals, also use accounting data in controlling their activity. Information concerning dues, fees, subscriptions, membership, sources of income, and causes of outgo—all such data are provided by accounting and are important for control of the economic activities of these organizations. The financial success or failure of a metropolitan art museum or a civic opera company is not, of course the criterion of its social usefulness. Nor is it the purpose of accounting to attempt to measure the social usefulness of institutions. Accounting is not used by non-profit institutions to justify or condemn their existence, but rather to insure the wise administration of the economic goods under their control.

[13] Adapted from C. R. Rorem, *Accounting Method*, pp. 3–9. (Chicago: The University of Chicago Press, 1928.)

Governmental organizations—nations, states, counties, townships, cities—all use accounting information for control of their activities. Accounting data are continually used by public officers to aid in the intelligent solution of such problems as legislative appropriations, tariff schedules, tax rates, executive salaries, etc. Governments also use accounting for the control of private business enterprise, as in the regulation of railroad rates, the control of banking operations, or the supervision of activities of trade associations.

The individual citizen as a consumer of economic goods also relies upon accounting to supply him with information concerning his own affairs. Even the simple problem of administering a household budget may well require some method of accounting, so that the household income may be effectively apportioned among the necessities and luxuries of life—food, rent, clothing, education, and entertainment.

Certain aspects of modern business make accounting of vital importance in the control of a specific enterprise. In the first place, modern business is complex; the operations of a single factory comprise such varied and technical activities as the mixing of chemicals, transportation of materials, assembling of parts, generation of power, testing of finished products, and supervision of workmen. It will often lie beyond the power of the most intelligent business manager to supervise and direct personally the varied processes being carried on under his control. His task is rather to co-ordinate the work of certain technical specialists who are responsible for the varied activities. In the second place, business enterprise is frequently operated on such large scale that its very size would prevent one man from directing it personally. Many enterprises employ thousands of men to carry on their activities. And even if the tasks of all these men were simple enough to be understood by a business manager, it would be impossible for him to maintain direct control over the activities of each employee. In the third place, the geographical areas of enterprise are often so great that peculiar problems of control arise. Many large companies employ salesmen and establish branches which operate in all parts of the world. Even a simple enterprise doing a moderate amount of business must maintain accounting records when the employees are continuously absent from the center of business activity. Other characteristics of modern business could be cited to emphasize the need for

some device to supplement direct personal observation and contact in the control of a given enterprise. Enough have been mentioned to demonstrate that the powers of the individual manager must be multiplied if he is to maintain control over important areas of economic activity. This multiplication of powers may be accomplished through recorded data, properly classified, summarized, and interpreted.

The method of accounting is an application of the quantitative method of scientific analysis, a method which confines itself to those aspects of phenomena which can be measured. Quantitative method is particularly applicable to the measurement of economic transactions, although it has been most fully developed in the natural sciences, where laboratory technique makes it possible to segregate phenomena for continued and accurate observation.

Quantitative method may be subdivided into two basic steps or processes. The first process is *measurement* of the phenomena to be studied. The phenomena may be the heat-producing qualities of certain foods, the tensile strength of metals, the mental capacities of factory employees, or the expenditures of a local government; the phenomena to be measured will vary with the field in which the quantitative method is being applied. The second process is *interpretation* of the data. This process usually involves classification and summarization, followed by the measurement of important relationships between classes and groups of data. The relationships are usually those which can be expressed in such terms as ratios and averages.

Recording is not included as a basic process in the quantitative method. Records are, of course, necessary to the application of quantitative method; in fact, records must be maintained during each phase of its application. Recording, then, is not a single process in quantitative method; it is rather a requirement which must accompany each of the processes, if the data are at all numerous.

There are two main types of quantitative method which may be applied to the analysis of economic phenomena—statistics and accounting. "Statistics" is the broader term, and sometimes the expression "statistical method" is used as synonymous with "quantitative method." Both statistics and accounting, however, may be regarded as applications of the same general method of analysis.

See also:
"The Comptroller Function," page 777.
"The Balance Sheet, the Profit and Loss Statement, and the Budget," page 780.
"Cost-Accounting," page 787.

6. SOME SIGNIFICANT STANDARDS: THEIR MEANINGS AND PURPOSES[14]

1. STANDARDS OF MEASUREMENT

a) *Meaning*

Reference and working standards for measurements of all kinds, including fundamental and derived *standards of measurements* for expressing the quantitative aspects of space, time, matter, energy, and motion, and of their interrelations.

By definition, specification, or material standard, covering, for example, length, area, and volume; mass, weight, density, and pressure; heat, light, electricity, and radioactivity; including for each the quantity, flux, intensity, density, etc.

b) *Purposes*

To aid accuracy in industry through uniform and correct measures.

To assist commerce in size standardization of containers and products.

To promote justice in daily trade through systematic inspection and regulation.

To facilitate precision in science and technologic research through calibration of units, measures, and instruments involved.

2. STANDARD CONSTANTS

a) *Meaning*

Natural standards or the measured numerical data as to materials and energy, known as physical or *standard constants*, that is, the fixed points or quantities which underlie scientific research and industrial processes when scientifically organized.

Mechanical equivalent of heat, light, electricity, and gravitation; specific densities; viscosities; melting and boiling points; heat capacity; heats of combus-

[14] Adapted from Irving S. Paull, J. W. Millard, and Jas. S. Taylor, *Trade Association Activities*, Domestic Commerce Series No. 20, pp. 312–13. (Washington: U.S. Government Printing Office, 1927.)

tion; velocity of propagation of light; conductivities of materials to heat and light; electrochemical and atomic weights; and many similar magnitudes determined experimentally with maximum precision and referred to fundamental standards of measure.

b) *Purposes*

To serve as an exact basis for scientific study, experiment, computation, and design.

To furnish an efficient control for industrial processes in securing reproducible and uniformly high quality in output.

To secure uniformity of practice in graduating measuring instruments, or in compiling tables for standards of quality and performance, and whenever such uniformity is desirable.

To aid laboratory research by reducing errors and uncertainty caused by use of data of doubtful accuracy.

3. STANDARDS OF QUALITY

a) *Meaning*

Specifications for material (by description, sample, or both), known as *standards of quality,* fixing in measurable terms a property or group of properties which determine the quality.

The numerical magnitude of each constituent property pertinent to the quality involved, and specific magnitude in units of measure of such significant factors as uniformity, composition, form, structure, and others.

b) *Purposes*

To secure high utility in the products of industry by setting an attainable standard of quality.

To furnish a scientific basis for fair dealing to avoid disputes or settle differences.

To promote truthful branding and advertising by suitable standards and methods of test.

To promote precision and avoid waste in science and industry by affording quality standards by which materials may be made, sold, and tested.

4. STANDARDS OF PERFORMANCE

a) *Meaning*

Specification of operative efficiency or action for machines and

devices, known as *standards of performance*, specifying the factors involved in terms susceptible of measurement.

Numerical statement of speed, uniformity, output, economy, durability, and other factors which together define the net efficiency of an appliance or machine.

b) Purposes

To clarify the understanding between maker, seller, buyer and user as to operative efficiency of appliances and machines.

To make exact knowledge the basis of the buyers' choice.

To stimulate and measure mechanical progress.

5. STANDARDS OF PRACTICE

a) Meaning

Codes and regulations impartially analyzed and formulated after study and experiment into *standards of practice* for technical regulation of construction, installation, and operation, and based upon standards of measurement, quality, and performance.

Collation of standard data, numerical magnitudes, and ranges of the pertinent factors defining quality, safety, economy, convenience, and efficiency.

b) Purposes

To furnish for each utility a single impersonal standard of practice as a basis for agreement of all interests, clearly defined in measurable terms.

To insure effective design and installation of utilities of all kinds.

To promote safety, efficiency, and convenience in the maintenance and operation of such utilities.

To secure uniformity of practice where such is practicable, and effective alternates in other cases.

See also "Industrial Standardization," page 791.

C. Reliance upon Individual Initiative

Let us suppose an absurd thing. Let us suppose that with existing natural resources, existing scientific knowledge, existing material equipment, and existing labor force, our society were organized with an omniscent benevolent despot at its head. By hypothesis this despot

knows everything; he knows the needs of his people, what goods ought to be produced, how they could be produced most effectively—everything. By hypothesis, this despot would not control society for his own selfish ends; he would control it for the good of the people. By hypothesis, this omniscient benevolent person has power to carry out his wishes. Although we cannot be sure precisely how this omniscient benevolent despot would organize the affairs of his society, we can see that responsibility for this organization is definitely placed. It is quite thinkable that the despot himself will take the initiative in making all decisions as to what shall be produced, where production shall take place, in what kinds of work the various individuals of society shall be engaged, what techniques and materials shall be employed. If he does thus act, if these and all other decisions concerning economic activities are made by him, it is obvious that he bears the responsibility for the planning and guidance of a coherent unified mechanism for supplying wants.

Our society is very different. In some respects our society illustrates the other extreme of ways of organizing to supply wants. We have a society of so-called "individual initiative," in which every individual of sound mind and of mature age has the opportunity and the responsibility of initiating activities. True, the activities of these individuals are in part controlled by formal and informal rules of the game. In large part, however, the matter is left to a competitive struggle. These individuals (acting thus on their own initiative) are enabled to organize social energy for productive purposes through the use of private property. Every individual may have private property rights; and in our exchange society the ownership of property enables the individual to *command* (through exchange) land, labor, and capital—and these he organizes in the productive process. As a means of facilitating his action, contractual relationships have been developed. Within certain broad limits every individual is permitted to enter into all sorts of contracts (agreements enforced through the law and the courts) with others; he has freedom of contract.

We are not at this time in a position to evaluate this way of doing things. That evaluation will come after we have examined at much greater length the operations of our economic order. At this time we are concerned solely with seeing that (*a*) upon the one hand the individual works within an intricate network of institutions, customs, and

attitudes (at the moment we are particularly interested in private property, freedom of contract, individual initiative, and pecuniary competition) which mold and dominate him; and (*b*) upon the other hand, he also actively and consciously adapts his conduct to accord with them and even utilizes them for his own purposes—in particular private property and freedom of contract are devices which the individual may use to carry out the opportunities and responsibilities with which he is vested.

The present section is designed to give a general view of the place of individual initiative in our economic activities and an understanding of the parts played by some of the more responsible agents in our economic order. With this as a background, later sections will deal more specifically with private property, with competition, with social control, and with those devices for the organization of economic activity which we call the forms of the business unit.

The readings in this section[14a] have been selected in the light of these issues:

1. In our society, how is it determined what goods shall be produced?
2. How are our social resources organized for getting these goods produced?
3. What types or classes of persons are in strategic positions with respect to the guidance of economic activity?

1. THE ENTREPRENEUR AND THE GAIN SPIRIT[15]

Perhaps the strongest motive influencing the individual to-day is that of gain. Other things being equal, *we do what pays best.* We take up the specialized work that we find most profitable. If we own a piece of land, we are likely to rent it or sell it for the specialized purpose which offers us the greatest gain. If we are operating a steel mill or a machine shop, we will make the implements that bring the greatest net return. This explains how society's story of raw materials, such as timber, coal, and iron ore, are made into one form of capital goods rather than another. Business men everywhere, not only the owners of factories, but also the owners of farms, stores, railroads,

[14a] A more detailed statement of issues may be found in *Outlines of the Economic Order*, pp. 75–76. (University of Chicago Press.)

[15] Adapted from Marshall and Lyon, *Our Economic Organization*, pp. 326–29. By permission of The Macmillan Company, publishers (1921).

mines, and all other business enterprises, are always trying to direct the land, labor, capital, and organization which they control into the production of goods which will give them the greatest gains. They direct productive energy into the channel where greatest profits are found.

The experience of a little town in Ohio during the Great War is illuminating. Before the war there was but one factory in this town. This was an automobile factory and nearly every worker in the town was employed there. The coal from a near-by mine was all used by the same company. All the steel and wood and rubber that were shipped into this town were used to make automobiles. But when the war began a stranger moved to the little city and put up a factory for the manufacture of war munitions. He did this because the government was offering such high prices for these munitions of war that he felt certain he could make good profits. He accordingly felt able to offer high wages to workers—higher than the automobile manufacturer could afford to pay. Before long nearly every man in the locality had left the automobile works and was employed in the munitions plant. These workers had followed the lure of the greatest gain. The owners of the neighboring coal mine also found the munitions manufacturer ready to pay more than they were receiving for coal. They agreed to sell their whole output to the munitions plant. A steel mill from which the automobile maker had been securing steel also received a high bid for steel from the munitions maker, and as a result their output of steel was soon diverted from the automobile shop to the munitions plant. Presently the automobile manufacturer closed his factory. He could not secure the men or materials for manufacture. The social resources upon which he had been relying had been drawn into another form of production by the lure of greater gains. This case well illustrates what we mean when we say that our productive resources are apportioned among our various enterprises on the basis of the comparative gains made in those enterprises.

The entrepreneur bears risks and takes profits.—In large part, then, our productive resources are apportioned—our economic activity is guided—by individuals who command society's resources and who follow the lure of gain. Who are these individuals? They are each and every one of us, for each of us apportions at least his own

work power. There are, however, certain individuals who specialize in apportioning productive resources, who do it on a much larger scale than most of us. These persons, sometimes called *entrepreneurs* or *enterprisers*, are business men who think they see a chance for gain by engaging in certain businesses, and assuming command, through private property rights, not only of their own productive resources but of those of the rest of us.

In effect such an enterpriser says to the rest of us: "I think I see an opportunity. Indeed, I am so sure of it, that I will place my own wealth in the position of first risk and engage in this enterprise. I should like some of you to work for me; you need take no great risk; I shall pay you a definite sum regularly. I should like to borrow land and capital goods from others of you; you also need take no great risk; I shall pay you definite sums regularly. I myself will be the risk taker of this enterprise. If things go badly in making the goods, or if it turns out that I have made a mistake concerning the existence of an opportunity, the rest of you will not lose. As I go along, I shall pay wages to those who work for me, and those who have loaned me land or capital goods will be safe because I shall pledge for repayment not only the things I have borrowed from you, but also my own property which has been put into the enterprise. On the other hand, having taken the risk, I expect also to take all gains which may be left after I have paid wages, and have paid for the use of the land and capital goods and have met other expenses."

It is hard to overestimate the importance of these organizers of production,[16] no matter whether they are operating stores, building railroads, running a farm, conducting a publishing company, or operating a theater. Clearly, if they have real vision and foresight with respect to profitable opportunities; if they are really able to forecast the wishes and wants of society; if then they are able to combine labor, capital, and land effectively, so as to use social energy efficiently, the "right" goods will be abundantly produced and all of us can get goods more easily than we could if social energy were used wastefully and inefficiently. Under such circumstances, the profits which these enterprisers would make might properly be regarded as payment to them

[16] Cf. Henry Clay, *Economics for the General Reader*, American edition, chap. iii.

for undertaking the risks connected with the organization of specialists in our society. On the other hand, if they are short-sighted or use poor judgment in converting social energy into goods, they are likely to suffer a severe financial loss. This fear whips many of them to strenuous work. We must not deceive ourselves with respect to the consequences of a failure of one of these enterprisers. At first glance we are likely to think that an unsuccessful entrepreneur loses money and that is the end of the matter. By no means. Social resources have been misdirected; they have been unwisely used; they are no longer available for wise use; our wants will not be as fully gratified as they would have been had this failure not occurred.

See also "The Services of Competition," page 410.

2. SOME RESPONSIBLE AGENTS[17]

1. *The rôle played by technical experts.*—The making and distributing of goods by the elaborate modern methods requires highly skilled direction. On the technical side the work is planned by, and executed under the supervision of, civil, mechanical, mining, and electrical engineers, designers, industrial chemists, "efficiency experts," etc. These are the men who know how to extract raw materials, refine and manufacture them, devise and operate machinery, organize working forces—in short, the men who know how to secure the principal efficiency of economic effort. By applying the results and the methods of science to the everyday work of the world, they have led the rapid advance in the technique of production of which we feel so proud.

2. *The rôle played by enterprisers.*—But in no country in the world are these technical experts allowed free scope in directing the work of providing material goods. Higher authority is assigned by the money economy to another class of experts, business men who are skilled, not in making goods, but in making money. As an employee of the business man, the engineer must subordinate his interest in mechanical efficiency to his superiors' interest in profitable investment.

[17] Adapted by permission from W. C. Mitchell, *Business Cycles*, pp. 32–37. (University of California Press, 1913. Author's copyright.)

The chief rôle in directing what use shall be made of the country's natural resources, machinery, and labor is therefore played by its enterprisers.

3. *The rôle played by lenders.*—The enterprisers, indeed, do not have unlimited discretion in deciding what use shall be made of the available resources, equipment, and labor. In matters of importance their decisions are subject to review by a higher court. For most business projects require the use of funds borrowed from banks, large capitalists, or from the investing public, and this fact gives the lenders an effective veto power over proposals which do not meet their approbation.

Whenever an enterpriser applies to an individual capitalist to take an interest in some project, to a bank to discount his notes, or to the investing public to buy bonds, he must satisfy the lenders of his ability to keep up the interest and to repay the principal. Even when the applicant can provide collateral security for the loan, and obviously when he cannot, the lender's decision depends largely upon his own judgment regarding the business prospects of the intended venture. To aid their officers in forming intelligent decisions, banks are coming to require applicants for loans to make on standard forms systematic statements of their financial standing and projects. In addition, the banks and the houses which grant mercantile credits subscribe to commercial agencies and maintain credit departments of their own for the purpose of collecting and classifying information about the business standing and prospects of their customers. Similarly, corporations which offer bonds or stocks for sale find it advisable to publish advertisements and circulars setting forth their financial condition, the purposes for which money is being raised, and the anticipated profitableness of the extensions in view. Affidavits from certified public accountants, legal counsel, and consulting engineers are often appended to lend these statements greater force.

The review of the projects of enterprisers by lenders, then, is no perfunctory affair. Nor is its practical influence upon the guidance of economic activity negligible.

4. *The rôle played by government.*—A fundamental difference of principle sets off the rôle played by government in guiding economic activity from that played by business enterprises. While business en-

terprises aim at making money, government aims at securing public welfare.

Notoriously, this broad difference of principle is sadly blurred in practice. Even in the most democratic countries, public welfare is not always the ruling passion of the men elected to office. Besides, public welfare remains so vague a concept as to leave wide room for differences of opinion about the relative value of rival policies proposed for its promotion. Moreover, among the citizens of a money economy the habit of applying pecuniary tests and accepting pecuniary standards gives a strong commercial flavor to their very statesmanship. Finally, government is forced to pursue its social ends largely by business methods. It must count the cost even when it cannot count the gains of what it does in dollars, and by some shift it must raise a money revenue to defray its money outgo. But, after all the necessary qualifications have been made, it still holds true that in dealing with economic problems government keeps closer to fundamental issues than is feasible for business men. Government can consider what needs it is important to satisfy, while business men must consider what market demand it is profitable to supply or profitable to create.

Were this difference of aim the sole difference between the public and private guiding of economic activity, society would probably be organized on the basis of state socialism instead of on the basis of money economy. But there is this further difference, that government is far less efficient in pursuing its aim of social welfare than business enterprise in pursuing its aim of making money. The scope actually accorded to government in managing industry has been affected no less by apprehension of this shortcoming than by appreciation of government's function as the guardian of common interests.

3. THE PROMOTER[18]

The function of a promoter.—A promoter is a man who organizes a new business and sets it going. The business need not necessarily take the form of a corporation. It may be handled as a partnership or a joint-stock company.

The promoter is necessary because the great mass of the funds

[18] Adapted by permission from W. H. Lough, *Corporation Finance*, pp. 154–58, 167–70. (De Bower Elliot-Co., 1909. Author's copyright, 1917.)

used in larger corporate enterprises is passive; that is to say, the owners of investment funds are not primarily engaged in buying and handling business enterprises. They wait until a good proposition is presented to them. The function of the promoter, therefore, is to bring his proposition to the attention of the owners of funds in such a manner as to arouse their interest and confidence and induce them to buy the securities of his new corporation.

"Discovery" of a proposition.—A promoter in handling an enterprise has three separate tasks before him. First, he must "discover" his proposition; second, he must "assemble" it; third, he must "finance" it.

The discovery of a proposition does not mean simply to find it, but includes a thorough investigation into all the surrounding conditions, and the solution in advance of all the difficult problems that are likely to arise in its development. Let us suppose, for instance, that a new invention which looks good on the surface is brought to the attention of the promoter. If he understands his business he will first of all examine critically every point that points toward the invention's success or failure. He will find out whether it is patented and just what features the patent covers. Next, he will consider whether other devices are in use which perhaps accomplish the same purpose as well or nearly as well as the invention. After making sure that the invention is what it purports to be, he will consider the possible markets for the article.

Next, the promoter takes up the cost of manufacturing. He finds out whether new and specially constructed machinery is necessary in manufacturing the invention, and whether any especial skill on the part of laborers is required. He considers the amount of experiment that will be necessary in order to perfect the invention and in addition figures a large amount of extra cost for unforeseen contingencies.

These are only a few of the factors that the promoter would investigate before taking any further action. Their number is sufficient to indicate, however, that any promoter who has a reputation to make or preserve cannot afford to jump hastily at whatever proposition is presented to him. The process of discovery may take a long time, perhaps months or even years.

"Assembling" a proposition.—By assembling a proposition is

meant the process of getting temporary control into the hands of the promoter. If he is dealing with an invention, he assembles the proposition by getting an option on the invention or by making an agreement with the inventor on a royalty basis. In the case of a consolidation of plants or railroads into a new corporation, assembling is frequently much more complicated and difficult. In such a case the promoter may have to get options or arrange the terms of purchase with every plant and perhaps with all the different classes of security-holders involved.

Financing a proposition.—Now we come to the most difficult part of the promoter's work, his financing of the new corporation. No hard and fast rules can be laid down to cover the promoter's procedure.

We may classify the men who spend a considerable amount of their time and energy in promotion into four groups. Let it be clearly understood, however, that this classification does not pretend to be complete.

First come the professional promoters, the men who really do make it their main, and almost their sole, business to hunt for enterprises that promise profits and to finance those enterprises. This type is common in fiction, but rare in real life. So far as the writer recalls, he has met only one man who could be put in this class, a tall, lank, fervent individual with a persuasive air.

The second class consists of lawyers and bankers in small communities. Such men have exceptional opportunities to inform themselves as to local conditions; they frequently take hold of some local enterprise, such as a steam or street railway, secure the assistance of experts for investigation and carry through the proposition to success. Still more frequently, however, so far as the writer has observed, such men underestimate the difficulties of the problem; they take it up with enthusiasm but are forced either to drop it or to call in men of wider experience.

The men to whom they generally turn constitute the third class of promoters, namely the large bankers and brokers. The amount of promotion work performed by such men is limited and they usually confine their active participation—except for advice—to the financing of such enterprises as they take up. Mr. J. Pierpont Morgan stands out as the most prominent example of this class.

The fourth class—and this is a recent important development—consists of engineering firms engaged in construction work of various kinds. Certain large engineering concerns have established a wide reputation for success in operating street railroads, water works, electric lighting plants, and so on. These firms naturally have built up a large and well-equipped staff of experts in those fields. As the staff is expensive, it becomes a pressing problem to keep them profitably employed all the time. In the effort to solve this problem such firms have drifted into the custom of taking up new enterprises of merit and performing the work of promotion themselves. Their prime object in so doing is to employ their own engineering talents and the abilities of their staff to the best advantage. Incidentally, of course, they have no objection to securing some of the other returns that naturally follow from successful promotion.

A further discussion of individual initiative as guided by the gain spirit may be found in the final chapter of Part III.

D. The Institution of Private Property

In our study thus far we have come to understand in a general way that the institution of private property is connected with individual initiative in two main ways. Upon the one hand, the individual sees in private property one of his largest motives or incentives to economic activity; working through the gain spirit, it spurs him on into activities desired by society and it lashes him back from activities not desired. Upon the other hand, through private property the individual is enabled to exercise control of economic activity; through exchange and through the use of contracts, property enables him to command the use of instruments of production. Since private property is utilized in such important ways, it has quite naturally come to be regarded as one of the chief organizing devices of our society.

Now, in as intricate and mutable a society as ours, it will be well if the important organizing devices are capable of change, flexibly adjustable to varied conditions, and yet inherently tough and sturdy. The institution of private property, while far from perfect as an or-

ganizing device, measures up to these requirements fairly well; and (what is vastly important) society can, if it but chooses, make it measure up much better.

If the following issues[18a] are kept in mind, the usefulness of the readings in this section will be increased:

1. What are the chief elements in the content of private property today? What are its chief attributes?
2. What evidence is there that private property is flexible and adjustable to varied conditions?
3. What outstanding types of justification of this institution have been advanced?
4. What is the economic function of contract?
5. What seem to be the dominant trends of the present day with respect to private property?

1. PROPERTY, OWNERSHIP, POSSESSION[19]

1. *Conception of property.*—There is, perhaps, nothing more difficult than to give a precise and consistent meaning to the word "property." When we speak of a man of property, we think, perhaps, in the first instance, of tangible, material things which belong to him—land and houses, horses and cattle, furniture and jewelry and pictures—things which he may use or destroy (so far as that is physically possible); from which he may exclude others; which he may sell or give away or bequeath; which if he has made no disposition of them will pass on his death to persons related to him.

But we shall find that our conception of property relates to many things which are not tangible or material. Our man of property may be an author or a patentee, and we shall hardly be able to say that his copyright or patent-right is not part of his property, or even to avoid speaking of his ownership of the copyright or patent. He will have debtors; his bank is a debtor to him for the amount standing to his credit; his investments of money are claims to receive payment from the State or from corporations or individuals. Such debts and claims are not rights over any specific tangible objects; they are mere rights against the State, or the corporation, or the person liable to pay. Yet

[18a] A more detailed statement of issues may be found in *Outlines of the Economic Order*, pp. 75–77. (University of Chicago Press.)

[19] Adapted by permission from W. M. Geldart, *Elements of English Law*, pp. 113–30. (Henry Holt & Co. Williams & Norgate.)

these rights are transferable, and will pass on his death to his representatives. We cannot exclude them from our notion of property or deny that in a sense, at any rate, he is the owner of them.

On the other hand, his "property" clearly does not include all his rights. To say nothing of his general right of liberty or reputation, his rights as a husband or a parent are not proprietary rights, nor is his right to recover damages for personal injury or defamation; but we may include among proprietary rights the right to recover damages though unliquidated (i.e., of uncertain amount until settled by a judge or jury), for breach of contract, or, probably, even for injury to his property.

Generally speaking, we shall include under the notion of a man's property in its widest sense all rights which are capable of being transferred to others or being made available for payment of his debts, or of passing to his representatives on his death.

2. *Ownership and possession.*—Turning to rights over tangible things, we must notice the distinction between ownership and possession. The owner of a thing is the person who has, in the fullest degree, those rights of use and enjoyment, of destruction, and of disposition, which have been mentioned above—subject, of course, to the general rules of law which protect the rights of others, and subject to certain limited rights which he or his predecessors may have created in favor of others. The owner of a pistol is none the less owner because the law prohibits him from discharging it in a public highway; the owner of a field does not cease to be owner because the public or a neighbor has the right to use a footpath across it.

The essence of ownership, then, is that it is a right or an aggregate of rights. Possession, on the other hand, is primarily a matter of fact. If the owner of a watch is robbed of it by a thief, the owner's rights as rights remain intact; the thief acquires no right to the watch as against the owner. But the owner's possession, and with it his actual power to exercise his rights, is for the time being gone; he must recover the watch—as he may even lawfully do by his own act—before he can be said to be again in possession of it. So, too, the owner of land may be out of possession, and another without right may be in possession. In this case the forcible retaking of possession is prohibited under penalties by statute; but the retaking, though punishable, is none the less effective to restore the possession.

The cases of the thief and squatter have been taken as the clearest instances of possession acquired without any right whatever. But possession may lawfully be acquired and yet be unaccompanied by ownership. An owner who delivers a horse or a bicycle by way of loan or hire to another parts with the possession of him, but does not cease to be owner. The same is true of one who delivers articles to another in order that the latter may bestow his labour upon them. Such voluntary transfers of possession are called bailments, and the person who so acquires possession is a bailee of the goods.

So far we have thought of ownership and possession as sharply distinguished—the one a matter of right, the other of fact. Nevertheless, possession is a fact which has an enormous legal significance, a fact to which legal rights are attached. In the first place, actual possession is evidence of ownership, and, except in cases where ownership is based on a system of public registration, it is hard to see how any ownership can be proved, otherwise than by going back to some prior possession.

In the second place, possession is not merely evidence of ownership, but (subject to the rights of the owner) is itself and for its own sake entitled to legal protection. The finder of goods is entitled—except only against one who can show himself to be the owner—to legal protection against all the world.

Lastly, we may notice that even wrongful possession, if continued for a certain length of time, matures into what, for practical purposes, is indistinguishable from ownership. A wrongful possession of land for twelve years, of goods for six years, destroys the owner's right to recover his property by action and, at least in the case of land, his right to retake possession.

2. THE ATTRIBUTES OF PROPERTY[20]

The right of property, says Art. 544 of the *Code Napoleon,* is the right to enjoy and dispose of things in *the most absolute fashion.* Although this definition has ceased to be altogether true—for the law of property is nowadays subject to ever-increasing restrictions—it brings into sharp relief that ownership really is, an absolute right: (1) ab-

[20] Adapted by permission from Charles Gide, *Political Economy,* 466–71. (D. C. Heath & Co., 1913.)

solute, in that it embraces the sum total of the satisfactions which may be obtained from a thing, including even the stupid satisfaction of destroying it; (2) absolute, in that it is not limited by time, or at any rate is limited only by the length of life of the object. *Perpetuity* and *free disposal* are, then, the two characteristics of the right of property.

1. *Perpetuity.*—When the right of property has for its object goods which perish in consumption, or which last but a short time, perpetuity is of no great economic interest, since it is not actually realised. But when the object appropriated is perpetual in its nature or at least very long-lived, the right of property appears in its full force and with all its consequences.

2. *Free disposal.*—The other essential attribute of the right of property is, as we have said, the right of *free disposal:* the right, as the French Code defines it, to enjoy and dispose of things in the most absolute fashion.

But this right "to dispose of a thing at will," which gives ownership the essentially absolute character without which we should not recognise it, did not always exist. It was only gradually that the idea of ownership widened, passing through the same progressive stages as the object of ownership.

The following, so far as we are able to conjecture, is the order in which the right of private ownership acquired its essential attributes:

(1) Probably the first right of property was that of *exploiting one's possessions,* i.e., turning them to account by the labour of others —slave labour in former times, the labour of the free wage-earner today. This was the most "noble" attribute, since it absolved the owner of property from personal labour.

(2) The right of *gift* seems to have been one of the earliest modes of disposing of wealth—at least in the case of "movable" objects— prior even to the right of sale.

(3) The rights to *sell* and to *let* do not seem to have appeared till much later—at least in the case of immovable property. Aristotle, in the fourth century B.C., declared that these were necessary attributes of the right of property, but does not speak as if they were at that time generally recognised. There were reasons enough, indeed, why they should not be. So long as property was vested in the family and was under the seal of religious consecration—which was the characteristic

of property in antiquity—alienation was not possible: it constituted an impious act on the part of any member of the family. Further, as division of labour and exchange did not yet exist, each family was self-sufficient and as movable wealth was rare—each man kept his own, sometimes even taking it to his tomb with him—sale could only be an exceptional and abnormal act. Thus, when it first appears, we find it compassed with extraordinary solemnities: it is a sort of public event. The *mancipatio*, for instance, had to take place in the presence of five witnesses, representing the five classes of the Roman people.

(4) The right *to bequeath*, i.e., to give by will, which has always been considered the most important attribute and the crowning feature of the right of property, prolonging as it does this right beyond death, was still slower in making its appearance.

3. FORMS OF WEALTH AND OF PROPERTY[21]

FORMS OF WEALTH

- Wealth
  - Real Estate
    - Land
      - Productive land
        - Crop land, grazing land, timber land, mining land, hunting land, fisheries
      - Ways of transit
        - Railways, roadways, waterways, parks
      - Building land
    - Land improvements
      - Buildings
      - Improvements on highways
        - Overhead
        - Underground
        - Surfacing
        - Bridging
      - Minor
  - Commodities
    - Raw Materials
      - Mineral
      - Agricultural
      - Manufactured
    - Finished products
      - Consumable
        - By being burned
        - By being eaten or drunk
        - By being otherwise used
      - Durable
        - Mechanical devices
        - Animals
        - "Hard money"
        - Clothing and jewelry
        - Furniture and works of art
        - Reading matter
        - Minor
  - Human Beings
    - Slaves
    - Free

[21] Taken by permission from Irving Fisher, *The Nature of Capital and Income*, pp. 7, 37. (The Macmillan Co., 1906.)

FORMS OF PROPERTY RIGHTS

- Property Rights
  - Complete (Fee Simple)
  - Partial
    - To services cut longitudinally
      - Rights in common
      - Rights to different usufructs
      - Partnership rights
      - Joint stock shares
    - To services cut transversely
      - Lease
      - Reversion
      - Patent and copyright
    - Rights to definite parts of services
      - Promises
        - Bonds
        - Private notes
        - Bank notes
        - Bank deposits
      - Orders
        - Checks, drafts, and bills of exchange
        - Irredeemable paper money
    - Minor and indefinite
      - Good will and custom
      - Taxing power

4. THE VARYING CONTENT OF THE TERM PROPERTY[22]

One of the mistakes oftenest committed is that of supposing that the same name always stands for the same aggregation of ideas. No word has been the subject of more of this kind of misunderstanding than the word property. It denotes, in every state of society, the largest powers of exclusive use or exclusive control over things (and sometimes, unfortunately, over persons) which the law accords, or which custom in that state of society recognizes; but these powers of exclusive use and control are very various and differ greatly in different countries and in different states of society.

For instance, in early states of society, the right of property did not include the right of bequest. The power of disposing of property by will was in most countries of Europe a rather late institution; and long after it was introduced it continued to be limited in favor of what were called natural heirs. Where bequest is not permitted, individual property is only a life interest.

Then, again, in regard to proprietary rights over immovables (the principal kind of property in a rude age), these rights were of very *varying extent and duration*. By the Jewish law property in immova-

[22] Adapted by permission from J. S. Mill, "Chapters on Socialism," *Fortnightly Review*, XXXI (1879), 526–30.

bles was only a temporary concession; on the Sabbatical year it returned to common stock to be redistributed; though we may surmise that in the historical times of the Jewish state this rule may have been successfully evaded. In many countries of Asia, before European ideas intervened, nothing existed to which the expression *property in land*, as we understand the phrase, is strictly applicable. The ownership was broken up among several distinct parties, whose rights were determined rather by custom than by law. In mediaeval Europe almost all land was held from the sovereign on tenure of service, either military or agricultural.

Again, if rights of property over the same things are of different extent in different countries, so also are they exercised over *different things*. In all countries at a former time, and in some countries still, the right of property extended and extends to the ownership of human beings. There has often been property in public trusts, as in judicial offices, and a vast multitude of others in France before the Revolution; there are still a few patent offices in Great Britain, though I believe they will cease by operation of law on the death of the present holders; and we are only now abolishing property in army rank.

We thus see that the right of property is differently interpreted, and held to be of different extent, in different times and places; that the conception entertained of it is a varying conception, has been frequently revised, and may admit of still further revision. It is also to be noticed that the revisions which it has hitherto undergone in the progress of society have generally been improvements. When, therefore, it is maintained, rightly or wrongly, that some change or modification in the powers exercised over things by the persons legally recognized as their proprietors would be beneficial to the public and conducive to the general improvement, it is no good answer to this merely to say that the proposed change conflicts with the idea of property. The idea of property is not some one thing identical throughout history and incapable of alteration.

5. THEORIES OF PRIVATE PROPERTY[23]

The earliest theory of private property as found in some of the Roman writers is *the occupation theory*. The doctrine that property

[23] Adapted by permission from E. R. A. Seligman, *Principles of Economics*, pp. 131–34. (Longmans, Green & Co., 1905.)

belongs of right to him who first seizes it is, however, one that can apply, if at all, only to the earliest stages of development. Where no one has any interest in the property, no one will object to the assertion of a claim by a newcomer. When property is without any discoverable owner, we still today assign it to the lucky finder. The occupation theory may explain how the present legal title to certain forms of property originated; it cannot serve as a justification of private property, except in the rare case of previously unoccupied or unutilized wealth. The mere fact that a person has seized a thing is no reason why he should retain it.

The next doctrine was *the natural rights theory*. Private property, so we were told by the philosophers of antiquity and the publicists of the later middle ages, is a natural right, a part of the law of nature. It will at once be asked, however, what is denoted by nature? The great philosophers of antiquity upheld private property in slaves as a natural right. Much of what we today consider natural, our descendants will deem unnatural. Our conception of nature in this sense is essentially ephemeral and mutable.

Driven from this position, the natural rights school took refuge in *the labor theory,* and maintained that the real title to private property is derived from the toil and trouble experienced in creating it. Surely, it will be said, a thing belongs of right to him who produces it. But at once comes the reply: no one has created the land. As a consequence, we find thinkers of all ages, from Phaleas of antiquity to the disciples of Henry George today, who contend that private property in land is unjust, while maintaining that private property in everything else is defensible. These critics, however, overlook the fact that the difference between land and so-called labor products is in this respect, at all events, one only of degree, because nothing is the result of individual labor alone.

Since, therefore, neither occupation, natural law nor labor gives an indefeasible title to private property, some philosophers were led to frame the so-called *legal theory* of private ownership which is in essence that whatever is recognized as such by the law is rightfully private property. Obviously, however, this is not an economic doctrine. Good law may be bad economics. The law generally follows at a respectful distance behind the economic conditions, and adjusts itself

gradually to them. The legal theory tells us *what* property is, not *why* it is, nor what it should be.

Thus we are finally driven to *the social utility theory*. This is really implied in the preceding theories and supplies the link that binds them all together. If we allow the individual to seize upon unoccupied wealth, if we recognize the existence of certain rights in what are deemed to be the products of labor, if we throw the mantle of the law around the elements of private property—in every case society is speaking in no uncertain voice and permits these things because it is dimly conscious of the fact that they redound to the social welfare.

6. A CASE FOR PRIVATE PROPERTY

A[24]

First and foremost, supreme, is a group of advantages bearing upon *the production of wealth,* arising from the superior activity, the sterner energy, the greater care in the use of tools, machinery, and plant, the saving of waste in materials and products, which, it is credibly alleged, belong to work done for an immediate individual reward, as compared with that done by him who only finds his interest or feels his duty as a member of a large body.

The second advantage of private property is that it sustains, fosters, and continuously develops, in mankind, that *care for a distant future,* that sense of responsibility for a provision for the young (beyond the mere period of nursing), which not only clearly and by an almost infinite interval, distinguish our race from the brute, but which become the object of the noblest exertion and sacrifices, the spring of the most heroic motives and impulses of which men are capable; in which, indeed, may be said to lie the special cause of man's progressive advancement, in mind, in character, in powers, and in arts, from the lowest to the highest; which, in a word, hold the secret of civilization.

The third advantage which we attribute to private property is that, through the foregoing sense of responsibility for provision for the young during a more or less distant future, it brings into operation the single force which has the virtue *to check the wanton, senseless,*

[24] Adapted by permission from F. A. Walker, *Discussions in Economics and Statistics*, II, 409–10. (Henry Holt & Co., 1899.)

brutal increase of population, amid squalor and hunger—the sure result of which is the degradation of the species, and the speedy loss of the richest and ripest fruits of time and experience.

B[25]

The moral advantage of private property over Communism is that it makes the private person think of his life as a whole, and realize his responsibility for his actions. In a society whose economic organization is at all developed, most property consists, not in rights to the enjoyment of things, but in rights to services; the power to make men act in certain ways. This power, it may well be contended, is as essential a part of what makes individuality in life as is the possession of objects.

But something else can be said for private property in the means of production. The argument may be put in some such way as this: It may be true that all productive work is co-operative and that, therefore, no wealth is produced by individuals in isolation but it does not follow that the part played by different individuals is the same or of equal value. Co-operation is the combining of different wills and different minds, and all deliberation and contrivance comes originally from individual minds. Efficient production is only possible if encouragement is given to originality and invention in individuals as much as to the co-operation between all the members of society. It may be true that power over and control of other men is liable to abuse, but it is also an essential instrument in achieving anything of note in combined effort. If private property gives men the power of directing others in the work of co-operative production, that is no evil but a manifest good if that power is in the hands of those who can use it best. Further, while it may be true that we cannot divide up wealth into parts and say this part was created entirely by this man and this by that, it does not follow that we cannot estimate the relative importance of the parts played by different men. On the contrary, a man's income does roughly express the value which society puts upon his services, and the money a man makes is a fair criterion of his capa-

[25] Adapted by permission from A. D. Lindsay, "The Principle of Private Property," in *Property, Its Rights and Duties,* pp. 73–77. (Macmillan & Co., Ltd., 1915.)

bility to use profitably the power over other men's lives which the possession of property gives. Such a criterion may not be infallible. No doubt it is not, but it is a better criterion than any other which can be substituted for it.

C[26]

For society, and in furtherance of civilization, I, Private Property, assert that I have performed these services, to wit:

First, I have rendered the fundamental conditions of social and industrial life safe and secure. Before I came into my own, the power to seize and hold summed up the ethics of ownership. Energies that might have gone into more productive employments were used in defending one's own or in appropriating one's neighbor's. But I established and secured social sanction and universal respect for the right of possession.

Second, the security thus afforded has caused the energies of men to be diverted from the acquisition to the production of wealth. It has led to the utilization of natural resources, and has provided opportunity for the use of long-continued and consistent industrial policies which have caused material goods to increase verily a hundred fold.

Third, such security has furnished an incentive to man as a worker to utilize his productive capacities to the full. It has caused him to sow, because it has promised that he, and not another, should reap. It has led him to sacrifice immediate gain in establishing new processes and in devising new instruments of production to the end that the earth might be crowned with abundance.

Fourth, I plead innocent of the charge of having favored a privileged "leisure class," upon whom I have showered plenty that has been wasted in riotous living. It is true that I have conferred wealth upon a few. But these few I have not particularly favored. I have chosen them for highly important and extremely dangerous social service. I have assigned to them the task of experimentation in consumption. Whatever bad they have found they have discarded. The good that they have discovered has in time been made the property of the masses. They are the vanguard of my army which is engaged in

[26] "My Apology," by P. Property. Taken by permission from W. H. Hamilton, *Current Economic Problems*, pp. 866–68. (The University of Chicago Press, 1915.)

raising the standard of living. The goods supplied to them are not rewards; they consist only of the laboratory materials necessary to the work which they are doing. Witness their suffering, their costs, and you can appreciate the heroism which makes them willing to serve society in so dangerous and important an undertaking. The extent to which, through their pioneer service, the formerly rigid boundaries of consumption have been extended attests my wisdom.

Fifth, I have greatly increased the product of industry by the use of vast stores of capital. The economic inequality which I have perpetuated has been the cause of the existence of so fruitful a fund. For its bulk has come from the very large incomes whose source I am. The savings which become the capital that turns the wheels of our mills, runs our machines, and speeds our trains across the continent on their missions of service are possible only because of me. And, but for the security which I offer, the investment of these savings would be impossible.

Sixth, I supply the people with abundance and contribute to the fullness of their lives. The security which I have brought about has almost eliminated risks. The result is decreased costs, which I generously offer to the public in decreased prices. The long-time productive operations, the improvements in technique, and the cumulative investment of capital, which I have brought about, confer the favors of plenty, variety, and cheapness upon all sorts and conditions of men. My aristocratic methods have been mere devices for securing democratic ends. I have forced my owners to use me productively. I have made them stewards of the commonweal.

Seventh, I have led society in its development to higher and higher planes. Out of my abundance they have been able to satisfy more and more of their material wants. The certainty with which I have endowed the satisfaction of the necessary material wants has enabled those who choose to give of their time, energy, and means of the immaterial things of life. Our culture, with its wide horizon and its varied content, is my handiwork. That civilization is not coarse and material and brutal is my doing.

Eighth, I have prevented a passing sentimentalism from sacrificing these more permanent values to the passing fancy of the moment. I have, at the cost of much misunderstanding and malignant criticism,

prevented the wealth that was needed for a richer life for the generations of the future from being wasted in satisfying the immediate wants of a few surplus individuals who promised no contribution to culture. I have preferred to have such wealth used in enlarging capital, thus making for bounty of goods, and in social experimentation whose end was to lead men to richer and fuller life. I have seen clearly that a deficiency of human life could easily be supplied within a generation, but that a deficiency in capital can never be made up; that cumulatively it becomes greater as the years pass; and that it must deny life to many yet unborn and rob others of comforts which otherwise would have made their lives less vain and hollow.

Ninth, I have proved myself the custodian of peace and have laid the foundations of a world-wide Christian community. The system of vested interests with which I have surrounded labor and capital has done more for the cause of peace than all other agencies combined. For I have increased many fold the costs to all classes of engaging in war. The world-wide industrial system which I have wrought is more powerful than all armaments combined in protecting a state against the encroachments of another state and it contributes more to nation's understanding of nation than the whole world-wide system of diplomacy. My success has not been complete, but that merely makes my continued presence and activity all the more necessary.

I would not detract one whit from the good intentions of my malefactors. I bear them no malice. My only plea is that I be judged according to my fruits. I am done.

7. THE POSITION OF PROPERTY IN AMERICA[27]

The fact is that private property in the United States, in spite of all the dangers of unintelligent legislation, is constitutionally in a stronger position, as against the Government and the Government authority, than is the case in any country in Europe.

This may seem a startling proposition; but I think a very brief glance at the known facts of history will be sufficient to support and sustain it.

[27] Adapted by permission from A. T. Hadley, *Undercurrents in American Politics*, pp. 38–56. (Yale University Press, 1915); and "The Constitutional Position of Property in America," *Independent*, LXIV (1908), 834–37.

Down to about the thirteenth century the system of land tenure in every country in Europe was a feudal one. It was based upon military service. The majority of those who wanted to cultivate the soil were unable to protect themselves against the dangers of war. In the absence of an efficient protector or overlord no amount of industry was effective and no large accumulation of capital was possible. The services of the military chief were indispensable as a basis for the toil of the laborer or the forethought of the capitalist. It was the military chief, therefore, who enjoyed not only the largest measure of respect, but the strongest position under the law. As the conditions of public security grew better, these things changed. From the fourteenth century to the nineteenth Europe has witnessed the gradual substitution of industrial tenures for military tenures, the gradual development of a system of property law intended to encourage the activities of the laborers and the capitalists, rather than to reward the services of the successful military chieftain. But down to the end of the eighteenth century this new sort of private property represented a superadded element rather than an integral basis of the constitution of society. And even the developments of the last hundred years in constitutional law and industrial activity have not been able to obliterate a certain sense of newness when we contrast the position of the aristocracy of wealth with that of the aristocracy of military rank.

In the American colonies, on the other hand, where the public law of the United States first took its rise, conditions were wholly different. People wanted no military chieftain to protect them, no overlord to rule them. There was plenty of land for all, plenty of opportunity for the exercise of labor and the use of capital. That man did the most for society who worked hardest and saved most. Under such circumstances the laws were so framed and interpreted as to give the maximum stimulus to labor and the maximum rights to capital. There was no military aristocracy which stood in the way.

There were, furthermore, certain circumstances connected with the adoption of the Constitution of the United States which provided for the perpetuation of this state of things—which made it difficult for public opinion in another and later age, when property holding was less widely distributed, to alter the legal conditions of the earlier period.

A large majority of the members of the Constitutional Convention of 1787 were men of substance; a considerable minority were men of wealth. This is of itself sufficient to account for the general tone of the Constitution on matters of property right. But there are certain clauses in that instrument which have been even more effective in securing the property holders against adverse legislation than the Convention itself intended or expected. It was in the first place provided that there should be no taking of private property without due process of law—a constitutional provision which prevented the legislature or executive, either of the nation or of the individual states, from taking property without allowing judicial inquiry into the public necessity involved, and without making full compensation even in case the result of such inquiry was favorable to the government; and it was further provided, by another equally important clause in the Constitution, that no state should pass a law impairing the obligation of contracts.

No man foresaw what would be the subsequent effect of these provisions in preventing a majority of voters, acting in the legislature or through the executive, from disturbing existing arrangements with regard to railroad building or factory operation until the railroad stockholders or factory owners had had the opportunity to have their case tried in courts. They indirectly became a powerful means of establishing the American courts in the position which they now enjoy as arbiters between the legislature and the property owner. For whenever an act of the legislature violated, or even seemed to violate, one of these clauses, it came before the court for review; and in case the court found that such violation existed, the law was blocked—rendered powerless by a dictum of the judges declaring it unconstitutional.

Why was not the constitution amended as time went on? Why did the intensely democratic America of the nineteenth century rest satisfied with constitutional provisions regarding property rights, which were devised by representatives of an aristocratic society in the eighteenth, under circumstances which strengthened the hands of the conservatives?

The first cause for this persistence of property right is to be found in the land policy of the United States. The method adopted in the

disposal of the public lands promoted democracy. Side by side with this effect, and in curious contrast to it, was an equally marked effect in promoting industrial conservatism. The immigrant who settled in the western states was offered two things: the vote, and the chance of becoming a landowner. The opportunity to own farms in freehold made ambitious settlers conservative.

The control of the government over corporations was weakened, and the rights and immunities of the property holders were correspondingly strengthened, by two developments of constitutional law whose effect upon the modern industrial situation may be fairly characterized as fortuitous. One of these was the decision in the celebrated Dartmouth College case in 1819; the other was the passage of the Fourteenth Amendment to the Constitution of the United States in 1868.

I call their effect fortuitous, because neither the judges who decided the Dartmouth case, nor the legislators who passed the Fourteenth Amendment, had any idea how these things would affect the modern economic situation. The Dartmouth College case dealt with an educational institution, not with an industrial enterprise. The Fourteenth Amendment was framed to protect the negroes from oppression by the legislature. It is doubtful whether a single one of the members of Congress who voted for it had any idea that it would touch the question of corporate regulation at all. Yet the two together have had the effect of placing the American industrial corporation in a constitutional position of extraordinary vantage.

In 1816 the New Hampshire legislature attempted to abrogate the charter of Dartmouth College. Daniel Webster was employed by the college in its defense. His reasoning so impressed the members of the court that they committed themselves to the position that a charter was a contract; that a state, having induced people to invest money by certain privileges and immunities, could not at will modify these privileges and immunities thus granted.

Again, by the Fourteenth Amendment to the Federal Constitution the states were forbidden to interfere with the civil rights of any person or to pass discriminating laws which should treat different persons unequally. This amendment, passed just after the close of the Civil War, was intended simply to protect the negro; to prevent the south-

ern states which were in the act of being readmitted to the Union from abridging the rights of the blacks. A number of years elapsed before the probable effect of this clause upon the constitutional position of industrial corporations seems to have been realized. But in 1882 the Southern Pacific Railroad Company, having been, as it conceived, unfairly taxed by the assessors of a certain county in California, took the position that a law of the state of California, taxing the property of corporations at a different rate from that of individuals, was in effect a violation of the Fourteenth Amendment to the Constitution, because a corporation was a person and therefore entitled to the same kind of treatment as any other person. This view, after careful consideration, was upheld by the federal courts. A corporation, therefore, under the law of the United States, is entitled to the same immunities as an individual; and since the charter creating it is a contract whose terms cannot be altered at the will of the legislature which is a party thereto, its constitutional position as a property holder is much stronger in America than it is anywhere in Europe.

8. THE FUTURE DEVELOPMENT OF PRIVATE PROPERTY[28]

We notice movements actually going on which take five directions, all of which are destined, as those responsible for these movements think, to improve the institution concerned, namely:

I. An increase in the mass of free goods.

II. A restriction of the extent of private property and corresponding extension of public property.

III. A development of the social side of private property.

IV. An extension of private property along certain lines: development of rights akin to private property.

V. Changes in the modes of acquisition of private property.

I. These free goods are very generally intellectual goods, ideas to which we fall heir with the expiration of specific pieces of intellectual property.

II. In regard to the extension of public property, illustrations readily occur. Public pleasure and playgrounds are examples. Natural wonders, historical scenes, etc., fall under this head; for example,

[28] Adapted by permission from R. T. Ely, *Property and Contract in Their Relation to the Distribution of Wealth*, I, 340–46, 361–94. (The Macmillan Co., 1914.)

Niagara Falls. Places of historical interest and many beautiful pieces of property ought to be public property and not private. Forests come under this head.

III. The present movement appears to be along the third of these lines, manifested in the increasing public control exercised over so-called public utilities, railways, gas works, etc. In the case of water-supply the main movement in the United States is for public ownership and there is clear indication of a purpose on the part of the American people to hand over to public ownership that whole class of undertakings which we call natural monopolies—those lines of business in which competition is excluded by the nature of the case; that is, permanent successful competition—provided control as opposed to public ownership does not prove successful.

IV. The fourth line of development is the extension of private property and the development of rights akin to property. Now this would seem to contradict the second line of development, but the apparent contradiction here is after all not a real contradiction because the development of private property to which reference is made is along new lines.

We need a development of private property sufficiently firm and strong to protect individuals who come into conflict with private corporations. Numerous illustrations of virtual invasions of property rights by powerful corporations can easily be cited. One of these is through false report of earnings, thus inducing individuals to make investments, getting their money from them under false pretenses. Note further the abuse of the interests of minority holders and "outside" interests.

But the author has in mind still another matter—the relations existing between persons and property, which show especially the necessity of a development of personal rights with pecuniary significance. First of all, let us think of the *right of a person to the protection of the valuable economic powers which he has,* those powers of pecuniary significance which are wrapped up in the natural person—intellectual powers and physical powers; the right to the strength of his arms against needless mutilation by transportation companies of all sorts, manufacturing companies, unscrupulous employers; a right finding one expression in an employers' liability to correspond with

the liability of those who damage valuable material property; that is, responsibility for damages of a pecuniary significance to the person.

We find also in process of evolution *the right to be well born,* to be born under favourable conditions. This is what tenement house laws mean, what sanitary laws mean—the right to a home under sanitary conditions; the right to a development of the powers of body and mind. Such a right is secured in part by our public schools and compulsory education. Laws shortening the length of the working day or week may also be regarded from the point of view of the right of children to be well born.

And what about the *right to an assured income?* It is certainly as important a right as could be developed; there is some movement in this direction. How far is it desirable to go in respect to this?

The right to reputation is also a right of this character and a right not well developed, although the theory of the law is that this right should be secured and we have some protection. It is difficult to secure this right without limiting free discussion and free speech.

V. We take up now the fifth line of development and deal with *modifications in the modes of acquisition of private property.*

It is sufficient for present purposes to call attention to the pronounced self-conscious efforts of civilised society to make it easier to acquire property through labour. This movement is one of the great dominant tendencies of our age, and never in earlier centuries has the world seen anything like it. Even a catalogue of existing measures would require much space. We have education in all its phases, protective labour legislation, modern industrial insurance, improved dwellings, and numerous other measures which will occur to the intelligent reader.

What is the conscious social tendency with respect to speculative gains? We can see when we review the whole ground—although it may surprise those who have not done so—that there is a clearly marked tendency unfavourable to speculative gains, including chance gains or, as they are technically called, gains of conjuncture.

We observe an increasingly severe inspection of banking business throughout the world and it is, in part, with a view to cutting down speculative gains. Publicity of corporate accounts tends in this direction. Speculation finds a considerable field in secrecy of accounts and

in false accounts. In the accounts of monopolies, especially, the tendency of unregulated private management is to cut down apparent gains.

We find a movement somewhat antagonistic to profits in the desire to restrict and regulate the amount received by capital.

We find also a tendency to reduce the gains of monopolies to what are regarded by legislatures and courts as fair returns to capital and enterprise.

Finally, we have efforts to cut down the private receipts of the rent of land. Apart from the agitation of opponents of landed property, we have a pronounced movement in favour of the public ownership of natural treasures and water-power.

We come next to modifications in the treatment of gifts and inheritances. This is one of the great world movements of the age which attracts inadequate attention at the present time. We not only have the taxation of gifts and inheritances, but we have a regulation apart from taxation.

A further discussion of private property may be found in the final chapter of Part III.

E. Competition as an Organizing Device

Individual initiative, using private property as an organizing device is competitively fitted into the economic process.

What is competition? Everybody knows; nobody knows. To a person with one intellectual background it means one thing; to another with a different background it clearly means another. The widely divergent definitions and characterizations current make one inquire whether the persons concerned are talking of the same thing. If they are, they seem to have very different points of view or very different purposes in making their analyses.

Perhaps we do not need to strive for an exact definition at the outset. Perhaps we shall be able to consider the subject intelligently without ever formulating a precise definition. We could scarcely define life, and yet we live and talk with some intelligence concerning life. The same situation may obtain for competition.

It is clear that we are not primarily interested in competition as a philosophical-biological concept. We are concerned with economic competition. Further, since we are studying the structure and functioning of industrial society, we are justified in considering economic competition primarily in its organizing capacity.

There can be no doubt that in a very real sense competition—pecuniary competition—is another organizing device in our industrial society. It assigns persons to their parts; determines what forms of organization shall survive; designates what ranges of industries and what plants within an industry shall come to the front; accounts for the rise and decline in economic importance of territories, cities, and markets; decides what technical processes and what marketing methods shall live; all this and more. Perhaps its main medium in working out these matters is price, using that term in a very broad sense, although in certain cases quality and service have been emphasized.

Certain points in connection with the foregoing statements should be brought clearly into consciousness. (1) It is not alleged that competition, especially pecuniary competition, is an organizing force properly applicable in all conditions and circumstances. On the contrary, there are clearly considerable areas in our industrial relations where some other organizing force, possibly that of *authority*, should be used. (2) Even where competition does act as an organizing force it cannot be maintained that it is the only possible one. Custom, also, to cite but one case, is an organizing force. (3) No one should claim that competition works perfectly even in its own proper field. It involves blunders both numerous and costly. This is to be expected. After all, economic competition is a recent device and many forces have contributed to cause it to operate under unfavorable conditions. (4) Economic competition is a term with varying content in different periods of history. It should not be regarded as a self-sufficing, self-regulating, self-operating device. It is subject to social control. We may have either *laissez faire* competition or regulated competition. As in the case of private property, competition, while far from perfect as an organizing device, measures up to the needs it serves fairly well; and, as in the case of private property, society can if it but chooses make it measure up much better.

The selections on competition have been chosen with these issues[28a] in mind:

1. What conceptions of freedom lie behind the use of competition as an organizing device?
2. What outstanding services are rendered by competition in our economic order?
3. Is competition some unchanging thing or are its forms and its utilization subject to control and alteration by society?
4. If we speak of our society as a "competitive order," in what sense is the statement correct?

1. SOME DEFINITIONS AND CHARACTERIZATIONS

"Competition is not law, but lawlessness. Carried to its logical outcome it is anarchy or the absence of law Man is a moral, spiritual, and social being, not dominated by animal law. There can be no such thing as a harmonized society with any competitive elements in it, and Christianity is impossible. Every man owes the world his life, and must live to have a life to give. In competitive conditions, not character, but cunning, survives. The gospel of success is the great insanity of modern materialism, absorbing the best brain, thought, and life of the race; we have been feeding our children to this great Moloch of success, but as a result we have been warping the intellect and making moral idiots."[29]

"Sweet competition! Heavenly maid! . . . . Nowadays hymned alike by penny-a-liners and philosophers as the ground of all society . . . . the only real preserver of the earth! Why not of Heaven, too? Perhaps there is competition among the angels, and Gabriel and Raphael have won their rank by doing the maximum of worship on the minimum of grace. We shall know some day. In the meanwhile 'these are thy works, thou parent of all good!' Man eating man, man eaten by man, in every variety of degree and method! Why does not some enthusiastic political economist write an epic on 'The Consecration of Cannibalism'?"[30]

[28a] A more detailed statement of issues may be found in *Outlines of the Economic Order*, pp. 75–79. (University of Chicago Press.)

[29] Cleveland *Citizen*, March 14, 1896. Attributed to George D. Herron.

[30] Taken by permission from Charles Kingsley, "Cheap Clothes and Nasty," Preface to *Alton Locke*, pp. lxviii–ix. (The Macmillan Co., 1889.)

"Competition was the gigantic motor that caused nearly everybody during the first nineteen centuries of Christian civilization to use all his mental and physical powers to get ahead. The best efforts of humanity, stimulated by competition . . . . have lifted our race to a standard where the mode of living of common laborers is more comfortable and desirable than the everyday existence of the kings of whom Homer sings."[31]

Competition signifies the operation of individual self-interest, among the buyers and the sellers of any article in any market. It implies that each man is acting for himself solely, by himself solely, in exchange, to get the most he can from others, and to give the least he must himself.

1. The idea of competition is opposed to combination. Wherever, and in whatever degree, buyers or sellers act in concert, whether by insisting upon a certain price, or by regulating the amount to be bought or sold, there competition is, in so far, defeated. In competition every man is supposed to be active and alert to slip in ahead of every other man and sell his own product first, and sell it at a higher price if possible. Men in this state act as freely and as independently as the minute particles of some fine dry powder absolutely destitute of cohesion. If any two particles in the economic mass stick together, so that one must move when, and as, and because the other does, competition is in so far defeated.

2. Competition is also opposed to custom. If in any degree one buys or sells at a certain price, if he buys or sells in a certain place, if he buys or sells of or to a certain person, because he has done so in the past, he obeys the rule of custom. In competition men are assumed in every transaction to seek and find their best market, that is, the place to buy or to sell, in which, at the time, and under the circumstances existing, they can get most for what they have to sell and will give least for what they wish to buy.

3. Competition is opposed to sentiment. Whenever any economic agent does or forbears anything under the influence of any sentiment other than the desire of giving the least and gaining the most he can in exchange, be that sentiment patriotism, or gratitude, or charity, or

[31] Richard Michaelis, *Looking Further Forward*, 1890.

vanity, leading him to do any otherwise than as self-interest would prompt, in that case, also, the rule of competition is departed from.

To take one example, note what is implied in the assumption of free competition with respect to the rent of land.

On the landlord's part that (1) he would as soon take a new tenant as retain one whose family had been on the soil for centuries; that (2) he will entertain no other consideration than the realization of the largest possible rent; that (3) he knows all the facts which in any way bear upon the highest rate that could be charged for the use of the land without driving away all would-be tenants.

On the tenant's part, that (1) he has the means to place himself elsewhere; that (2) he could carry with him the value of his stock and fixtures, and of any improvements made during his tenancy; that (3) he knows and can intelligently canvass the varying advantages of a sufficient number of localities to make his choice practically indefinite; and that (4) neither indolence, nor inertia, will intervene to keep him from his best market; that is, where he can rent land, of a given degree of productiveness, at the lowest annual rate.[32]

"The strict meaning of competition seems to be the racing of one person against another, with special reference to bidding for the sale or purchase of anything. This kind of racing is no doubt both more intense and more widely extended than it used to be: but it is only a secondary, and one might say an accidental, consequence from the fundamental characteristics of modern industrial life. . . . . These characteristics are a certain independence and habit of choosing one's own course for oneself, a self-reliance; a deliberation and yet a promptness of choice and jüdgment, and a habit of forecasting the future and of shaping one's course with reference to distant aims. They may and often do cause people to compete with one another; but, on the other hand, they may tend, and just now indeed they are tending, in the direction of co-operation and combination of all kinds, good and evil.

"The term 'competition' has gathered about it evil savour, and has come to imply a certain selfishness and indifference to the well-being of others. Now it is true that there is less deliberate selfishness in

[32] Adapted from F. A. Walker, *Political Economy*, pp. 91–92 and p. 204. (New York: Henry Holt & Co., 1888.)

early than in modern forms of industry; but there is also less deliberate unselfishness. It is deliberateness and not selfishness that is the characteristic of the modern age."[33]

"Its opponents have rarely done it full justice. They have been so impressed by certain incidental evils connected with the system—smaller capitalists pushed to the wall by larger capitalists; intelligent workmen thrown out of employment by the process of industrial readjustment to make room for those cheaper and less skilled—that they have shut their eyes to its essential excellences. They have said that competition was nothing but a new name for the Darwinian struggle for existence as applied in modern business; that it was a glorification of the principle of survival of the strongest. This is a very imperfect view of the case. Competition is something essentially different in character from the struggle for existence among the lower animals. It is a struggle so ordered that outside parties reap a benefit instead of suffering an injury. This is its conspicuous and distinctive feature. If cats are struggling to get the same bird, and bosses are struggling to get the same workmen, the relation of the cats to one another bears some analogy to the relation of the bosses to one another. But there is this radical difference in the whole transaction: that the more cats there are, the worse for the bird; while the more bosses there are, the better for the workmen. Competition is what its name implies—a concurrent *petition;* an effort on the part of different people to do the best they can for somebody else, in order to induce him to enter into dealings with them.

"Unfortunately, it is not only the opponents of competition who fail to recognize this as its essential feature. The advocates of the system are prone to make a somewhat similar mistake. They go so far as to assume that any adjustment which is the result of free play among a mixture of conflicting social elements, strong and weak, is presumably right, and should be interfered with only when the resulting evils are so clear as to furnish the most obvious grounds for state action."[34]

[33] Adapted by permission from Alfred Marshall, *Principles of Economics,* pp. 5–6. (Macmillan and Co., Ltd., 1912.)

[34] Adapted by permission from A. T. Hadley, *Freedom and Responsibility,* pp. 121–23. (Charles Scribner's Sons, 1903. Author's copyright.)

2. THE FORMS OF ECONOMIC COMPETITION[35]

The chief forms of competition are five in number—commodity competition, individual competition, market competition, class competition, and race competition.

1. By *commodity competition* is meant the competition due to the existence of social choices. Every individual is continually debating with himself whether to purchase one commodity in preference to another. Where he is on the margin of doubt or of indifference the slightest alteration in the price will cause him to substitute something else. The principle involved is hence called the principle of substitution. The vendor must constantly be on the watch lest any increase of price cause the disappearance of his sales. We substitute, however, not only one thing for another, but also one agency of production for another: in the crucible of economic wants everything is finally tested by its capacity to afford the greatest satisfaction. Not only will the consumer choose now this and now that commodity, but the employer will increase now his labor force, now his stock of machinery, so as to secure the best results. The least change in the rate of wages or of interest may lead him to substitute the one for the other. Every economic factor, like every economic good, may be in either actual or potential competition with another. The existence of competition, however, implies the mobility or free interchange of the factors of production from enterprise to enterprise and from commodity to commodity. When the fluidity of capital and the transferability of labor are complete, the competition is absolutely free. When there are hindrances to this mobility, we speak of economic friction. The substitution of one commodity for another may be hindered by legal, social, or economic causes. Under normal conditions, however, the competition is real and effective.

2. The *competition of individuals* with each other denotes a rivalry, not between the producers of different commodities or between the different factors of production, but between the producers of the same commodity or the same factors of production. Under normal conditions competition here puts everyone on his mettle, and success is a measure of the contribution to the social fund. The more a laborer

[35] Adapted by permission from E. R. A. Seligman, *Principles of Economics*, pp. 141–45. (Longmans, Green & Co., 1905.)

produces, the higher his wages will be; the larger the output of a particular cotton mill and the lower the cost at which it can market its goods, the greater will be the benefit to the consumer as well as the advantage to the particular producer. Competition between individuals is in its results a struggle to enhance efficiency, to increase faculty, to multiply productive power, to augment ingenuity, in short, to develop economic personality. The more potent the personality, the greater will be the command over powers of nature, the more rapid will be the development of the wealth which, although owned by individuals, yet inevitably ministers to the welfare of society.

3. By *market competition* we mean, not the competition of individuals in the market, but the competition of markets with each other. Market competition includes, indeed, both commodity competition and individual competition in the sense that in every market individuals as well as commodities compete with each other; but it is something over and above these. Every great city is continually striving to develop as a centre of distribution and exchange in the well-founded hope that the wealth thus amassed will lead to productive efficiency in other lines. Here again market competition leads to reduced cost, and the struggle for market supremacy can be fought to a successful issue only through more effective service.

4. *Class competition* is the result of the differentiation of modern society into groups of producers. We have, not only the great division into laborers and capitalists, but the further separation of the latter into the owners of agricultural, commercial, and industrial capital—that is, landowners, merchants, and factory owners—and the still further subdivision of each class into minor groups. Class competition, while as inevitable as the other forms of competition, is within proper bounds just as beneficial. Whether the moneyed interest or the landed interest is more prosperous depends at bottom upon their success in making converts among the consumers, and the extent of conversion depends on what they can offer in the way of lower prices or better products. The laborers and the capitalists again represent competing interests, but the share of each in wages and profits depends ultimately on their relative contribution to the common product.

5. *Race or national competition* in its economic aspects is the final form of the modern struggle. The most marked characteristic of re-

cent progress is the gradual substitution of peaceful rivalry of commerce for the sanguinary clash of arms. The modern weapon is not the javelin or the rifle but the enterprise of the domestic producer aided by the exporter. Every nation that has reached commercial or industrial maturity endeavors to seek in the foreign market a profitable outlet for its own surplus production. This attempt to secure a market is indeed responsible for an occasional war. In the main, however, the struggle today is one for cheapness, and in the end it is not the large army or navy but the most efficient producer that permanently retains the neutral market. It is not to be denied that both a large army and a large navy may be needed to protect the commercial or other national interests; but the foundation of military greatness in modern times is primarily economic, and when economic efficiency has disappeared, military strength must also disintegrate. Here, again, national competition is salutary. The fundamental error of the old mercantilistic doctrine was the belief that what one nation gains in trade, the other necessarily loses. The modern doctrine is that every nation is helped by the prosperity of its neighbor, on the principle that the more wealthy the customer, the greater will be his purchases. Both nations may gain, although one may gain more than the other.

3. COMPETITION AND ECONOMIC FREEDOM[36]

1. The first and most obvious form of freedom is that of *marriage and divorce*. Marriage indeed is far more than an economic contrivance, even though the historical forms of marriage have been influenced by economic forces to a greater extent than is commonly recognized. Freedom of marriage especially is a product of the modern economic life. Freedom of divorce, on the other hand, existed in early society, but was at first based on inequality. After the patriarchal and modern family had been constituted, the husband could divorce the wife, but not vice versa. The newer right of divorce which rests on equality is in large measure the result of the economic emancipation of woman. Into the wider ethical and religious aspects of this great problem the present is not the place to enter.

2. Next we have *freedom of movement*. In the Middle Ages the

[36] Adapted by permission from E. R. A. Seligman, *Principles of Economics*, pp. 165–70. (Longmans, Green & Co., 1905.)

right of internal migration was often restricted. Under the settlement laws in England, for instance, it was virtually impossible for a workman to leave his native parish. In modern times the growth of freedom has brought the right, not only of internal, but of international migration. On the other hand, the prohibition of immigration which is sometimes found in modern countries must be judged in the light of liberty in the positive sense. Chinese immigration into the United States, for instance, is forbidden. Freedom of immigration, which in this case means prosperity for the employer and comparative comfort for the immigrant, implies permanent degeneration for the American workman and thus ultimate economic decay. It is a specious liberty, because based on inequality.

3. We come next to the *freedom* of occupation. The right of choosing one's profession was in former times hedged in by all manner of barriers. At its worst the system of caste and custom prevented progress because it put men into vocations for which they were not fitted. Freedom of occupation insures as far as possible the right man for the right place, and this leads to enhanced production and better distribution. The only restriction which modern society permits is the evidence of fitness, in those occupations where incompetence would imply irresponsibility and involve injury to others as well as to oneself. The certificates required from doctors, dentists, engineers, plumbers, pilots, and the like are not a hindrance, but an aid, to true liberty. The apprenticeship regulations of the trade unions, however, are sometimes good, sometimes bad. Where they are designed to insure good work, or even to prevent degradation of wages and the workman's standard of life through the irruption of large numbers of underpaid apprentices, there is much to be said for the practice. But when the object is simply to keep out competent workmen and to erect a monopolistic closed corporation, as in the late stage of the guild system, the limitation is clearly indefensible.

4. Another kind of freedom is the *freedom of association.* The chief forms of association for economic purposes are combinations of labor and combinations of capital. In classic Rome, where both political and economic aims were sought, we find a stern repression of labor associations. Even after the right of political and religious association had been won, however, combinations of labor were prohib-

ited. Under the modern factory system, such combinations have assumed the form of trade unions. It was not until 1824 in England and considerably later in America and Continental Europe that the prohibition was removed. The legitimacy of union, as such, is now accepted because it is recognized that it tends to secure the real freedom of the laborer. The individual workman in a large factory is at a clear disadvantage in dealing with the employer; the union restores the equality by securing the right of collective bargaining. In the same way the right of free association of capital in the form of corporations and other combinations has been acquired chiefly in the past half-century. Here again, however, when the nominal liberty of association results in a "restraint of trade" or virtual monopoly inimical to the general interests, the community is justified in curbing its excesses whenever the contest involves a crass inequality or is conducted without any sense of social responsibility.

5. The fifth category, *freedom of consumption,* needs only a word in this place. The sumptuary laws of old which prescribed in detail what should be eaten or worn were sometimes well-intentioned, but always mistaken. By restricting the expansion of wants, they really checked economic progress. Modern society has abandoned such a system completely, and where it becomes desirable in the interests of the public health or safety to prohibit the use of certain commodities, like over-ripe fruit, or infected meat, or opium, the end is attained far better by a prohibition of sale, under the police power of the state, than by a restriction of consumption.

6. We come, sixthly, to *freedom of production,* including freedom of contract and enterprise. Here, again, the emphasis has been shifted in modern times. The world has outgrown the time-worn conception of the citizens as the children of an all-wise and benevolent paternal government. It has been realized that governments are not always benevolent and never all-wise, and that with the growth of capital and competition better results can be secured by the repeal of the complicated and often contradictory provisions which throttle production and check individual initiative. It was this that the French manufacturers meant when they told Colbert *laissez nous faire* and thus introduced a celebrated phrase. That was indeed the necessary destructive process of pulling down the barriers which impeded progress because they

checked equal opportunity. It has been found requisite, however, in recent times to modify both the theory and the practice of *laissez-faire* in order to safeguard the interests of various classes of society. The complex requirements of modern life have necessitated a governmental regulation of many business enterprises in behalf of producers, of consumers, of investors, or of the general public. The difference between mediaeval and modern interference is to be found chiefly in the fact that the one sought to prevent competition while the other endeavors to enlarge its domain and to raise its level.

7. Finally, we have *freedom of trade*. This is virtually included under the last head, since trade is a species of production. It forms, however, so important a part of the subject that it has generally been treated separately. The modern age has seen the emancipation of internal commerce from mediaeval restrictions of all kinds. The great controversy today centres about international trade. Here, again, the general hypothesis must be in favor of freedom. Free trade, however, is not necessarily and always beneficent.

4. SOME INTERPRETATIONS OF THE CONTENT OF FREEDOM

A. FORMAL VERSUS EFFECTIVE FREEDOM[37]

In its external aspect, freedom is negative and *formal*. It signifies *freedom from subjection* to the will and control of others; exemption from bondage; release from servitude; capacity to act without being exposed to direct obstructions or interferences from others. It means a clear road, cleared of impediments, for action. It contrasts with the limitations of prisoner, slave, and serf who have to carry out the will of others.

Exemption from restraint and from interference with overt action is only a condition, though an absolutely indispensable one, of *effective freedom*. The latter requires (1) positive control of the resources necessary to carry purposes into effect, possession of the means to satisfy desires; and (2) mental equipment with the trained powers of initiative and reflection requisite for free preference and for circumspect and far-seeing desires. The freedom of an agent who is merely released from direct external obstructions is formal and empty. If he

[37] Taken by permission from John Dewey and J. H. Tufts, *Ethics*, pp. 437–38. (Henry Holt & Co., 1910.)

is without resources of personal skill, without control of tools of achievement, he must inevitably lend himself to carrying out the directions and ideas of others. If he has not powers of deliberation and invention, he must pick up his ideas casually and superficially from the suggestions of his environment and appropriate the notions which the interests of some class insinuate into his mind. If he have not powers of intelligent self-control, he will be in bondage to appetite, enslaved to routine—imprisoned within the monotonous round of an imagery flowing from illiberal interests, broken only by wild forays into the illicit.

B. NEW TYPES OF FREEDOM[38]

Seen from this angle, "liberty" takes on a new and greater meaning. In order to contrast the older, more formal ideal with this new substantial liberty, let us place the two side by side in parallel columns.

The Older Constitutional Rights	New Economic and Social Rights
1. Right to the equal protection of the laws.	1. Equal opportunities for all in the open market. *a*) The equal use of public facilities such as railways, canals, terminals, warehouses, wharves, etc. *b*) Freedom from unfair and corrupt methods of business competition, fraud, misrepresentation, combinations to destroy a competitor, exclusive contracts to stifle competition, etc.
2. Right of persons accused of crime to be safeguarded in criminal procedure.	2. Right to real protection against criminals. Cheaper and quicker justice. *a*) A simplified, less technical procedure in both civil and criminal suits. *b*) A more complete, efficient and thorough police system in both city and country districts. *c*) A more careful sifting of the chance offender from the habitual criminal.

[38] Taken by permission from J. T. Young, *The New American Government and Its Work*, pp. 497–98. (The Macmillan Co., 1915.)

The Older Constitutional Rights	New Economic and Social Rights
3. Freedom of speech, press and religion.	3. The freedom of the consumer from extortionate and oppressive charges in all articles of common use, meats, foods, drugs, beverages, shoes, clothing, coal, tobacco, sugar, oil, express and transportation charges.
4. No person shall be deprived of life without due process of law.	4. No person shall be deprived of the opportunities of improvement, education, and recreation, even with due process of law.
5. Freedom from compulsory quartering of soldiers in time of peace; freedom from searches and seizures in homes and dwellings.	5. Freedom from overcrowded unsanitary houses, factories, and stores; right to tenement and factory inspection and regulation.
6. No person shall be deprived of liberty or property without due process of law.	6. Right to full participation in economic progress and a salary or wage payment that will support a reasonable standard of living.
7. Right to bear arms.	7. Right to aesthetic and other higher enjoyments of civilization.

We must see clearly that the old legal freedom was a means to an end. When men were fighting a tyrant king or a selfish mother country they wanted "liberty" to pursue "happiness" or "freedom of speech," both of which were denied them. When their business is assailed by a combination, or their own and their children's chances of advancement are blocked by one or another cause, they demand greater "freedom of business opportunity." The obstacles to progress are different, the meaning of "liberty" changes.

5. THE SERVICES OF COMPETITION

A. GENERAL STATEMENT[39]

What services are they which we look to competition to perform? The first of them is the determination of prices. By this determination of prices it regulates, in the second place, the amount of production.

[39] Adapted by permission from John Bascom, *Social Theory: A Grouping of Social Facts and Principles*, pp. 148–51. (Thomas Y. Crowell & Co., 1895.)

In the third place, by the same means, it adapts production to the wants of men, and, in the fourth place, improves it in quality.

Competition determines prices.—We wish the most skilful production, we wish the low prices incident to it, and these we secure by the sifting processes of an active market. Yet this regulation is not perfect. There are most undesirable and extreme fluctuations in prices, and adventitious forces find their way freely into them. The work is done; not perfectly, but we do not as yet see how it can be better done.

Competition regulates the amount of production.—The rise and fall of prices determine the activity we can wisely direct to each branch of business. The automatic mechanism which apportions human effort among the innumerable forms of production is set in motion by competition. Here again we make bad mistakes, and suffer the evils of over-production; but we can conceive of no oversight which would take the place of the eager, interested, universal watchfulness called out by competition. The man who makes a mistake is immediately punished, and he who is alert and astute is as quickly rewarded.

Competition adapts production to the wants of men.—Competition is also constantly operative in adapting commodities to the wants and tastes of men. The increasing suitableness of products is one of the conspicuous gains of civilization, and is due almost wholly to that eager competition which is on the alert to discover and call out a new demand. This impulse has also its evil side. Desires are evoked in a mischievous, as well as in a desirable, form, and trade, seeking immediate profit, proceeds in oversight of greater ultimate good. Yet the more substantial gains are usually found with the more sound and comprehensive purposes.

Competition improves quality.—Akin to this improvement in kind is the improvement in the quality of goods. Great successes are often achieved in this direction. The enterprise that shows itself in superior quality of production unites at once personal and general welfare. Nor can we otherwise give equal vigor to this spirit of improvement. Yet here, as elsewhere, our gains are accompanied with corresponding losses. Competition is responsible for those imitations and imperceptible changes which cheapen products without an equivalent reduction of prices. Each advance gives occasion to a regression by which our gains are in part stolen from us.

Competition regulates the sharing of goods.—Competition, through its service in settling price, quantity, adaptation, and quality, becomes the chief instrument in distribution. While we are by no means satisfied with the way in which products are divided among producers, we are at a loss to discover any more just principle than that involved in competition, or any practical method of distribution promoting more effectively the general purpose of social discipline.

B. COMPETITION DETERMINES THE FATE OF INDUSTRIES[40]

Suppose that the market price of iron, as fixed by supply and demand, is insufficient to cover the expense of producing it. No investor seeking a business opening is likely to go into the production of iron, nor will those already engaged in the business increase their plant or even renew it when it wears out. If at the same time there is another article, for instance, copper, whose market price, as fixed by supply and demand, affords a large excess over the expense of production, new investors will seek to produce copper, while those already engaged in the business will extend their plant and keep it up to the highest standard of efficiency. We shall see a diminution of the output of iron and an increase of the output of copper, by a process which, though not generally involving actual transfer of capital from one industry to another, amounts to the same thing in its effect on the community. The permanent supply of iron being diminished, while the conditions of demand remain the same, the producers will be able to charge a higher price and yet dispose of the total product; while, conversely, the permanent supply of copper being increased, the producers will be forced to charge a lower price in order to call forth a corresponding demand. This process will go on until the profit in the production of copper is no greater than that in the production of iron.

This adjustment actually takes place among the industries of the country as a whole.

C. COMPETITION DETERMINES SURVIVAL OF INDUSTRIAL METHODS[41]

When the handicraftsman begins to find his product undersold by the machine-made article, his first instinct is to engage in a desperate

[40] Adapted by permission from A. T. Hadley, *Economics*, pp. 86–87. (G. P. Putnam's Sons, 1899.)

[41] Taken by permission from Sidney and Beatrice Webb, *Industrial Democracy*, pp. 414–16. (Longmans, Green & Co., 1902.)

competition with the new process, lowering his rate for hand labor to keep pace with the diminished cost of the machine product. This is obviously the "line of least resistance." He confidently pits his skill against the first clumsy attempts of the undeveloped machine, and finds that a slight reduction in the Standard Rate for hand labor is all that seems required to leave his handicraft in full command of the market. His well-intentioned friends, the clergyman and the district visitor, the newspaper economist and the benevolent employer, combine to assure him that this—the Policy of Lowering the Dyke—is what he ought to adopt.

But, unfortunately, this is to enter on a downward course to which there is no end. The machine product steadily improves in quality and falls in price, as the new operatives become more skilled, and as the speed of working is increased. Every step in this evolution means a further reduction of rates to the struggling handworker, who can only make up his former earnings by hurrying his work and lengthening his hours. Inevitably this hurry and overwork deteriorate the old quality and character of his product. The attempt to maintain his family in its old position compels him to sacrifice everything to the utmost possible rapidity of execution. His wife and children are pressed into his service, and a rough and ready division of labor serves to economize the use of the old thought and skill. The work insidiously drops its artistic quality and individual character. In the losing race with the steam engine, the handwork becomes itself mechanical, without acquiring either that uniform excellence or accurate finish which is the outcome of the perfected machine. Presently, the degraded hand product will sell only at a lower price than the machine-made article. The worse the work becomes the more irregular grows the demand. Those select customers who have remained faithful to the hand product find, by degrees, that its former qualities have departed, and they one by one accept the modern substitute.

There is now no question of his taking to the new process, which has risen quite beyond his capacity. He passes through the long-drawn-out agony of a dying trade.

D. COMPETITION PROMOTES MORAL QUALITY[42]

Whatever its evils, competition *promotes individuality, self-reliance, and earnestness.*

In so far as a man can and does live upon traditional ideas and feelings, without the necessity of exercising choice or of testing his principles by use, he fails to achieve individual character and self-reliant manhood. It is by permitting this, and so relaxing the tissue of personal character, that the most elaborate social systems of the past have decayed. The man who has made his way in a competitive order has learned to resist suggestions, to select and develop one class of influences and reject others, thus achieving self-knowledge and effective will. At the same time, as we have seen, he is forced to study other men and to develop a robust type of sympathy. The plainest workman, thrown upon his own resources, becomes something of a diplomatist, a student of character, an experimental observer of social forces. It is the tendency of a competitive society of the better sort to make every man a man of the world. He undergoes at once individualization and socialization, these two proceeding hand in hand, in a wholesale social life, each enriching the other.

Again, it is not the least of the merits of competition that it makes life earnest by giving to men a definite, difficult, and urgent problem to solve. The present age is alleged to be material, and so vulgar, with too much to eat and drink and wear and no faith or aspiration. But is it not surprising, on the whole, that this facility of production, this economic abundance, has produced so little frivolity, sensuality, and gross self-indulgence? The present régime gives a man material goods only upon condition that he become something of an idealist, allows him plenty only when he is proved capable of abstinence; and he often learns his lesson so well that he comes to care even less than is right for the pleasures of sense, and to turn from them when they are within his reach.

A very powerful source of the sentiment against competition and of the belief which many cherish that it cannot be a permanent feature of social life, lies in its connection with personal ill-feeling. It is often said to be in its very nature anti-social, a state of war instead of

[42] Taken by permission from C. H. Cooley, "Personal Competition," *Economic Studies*, IV, 146–66. (American Economic Association, 1899.)

a state of peace, generating hostile passions instead of sympathy and love. The bloody conflicts of our brute ancestors have been replaced by something less obvious and open but—so we are told—equally bitter and destructive, morally speaking the same thing.

Yet there is no inevitable association between competition and hostility. In great measure the selective process operates without generating personal feeling. A young man, for example, starts out in life with the purpose of following a certain profession—let us say the law. The experience of two or three years convinces him and others that he cannot succeed in this, and he makes his way into something else. About half the graduates of our law schools are eliminated in this way, and the same sort of thing takes place in other trades and professions. But the process is gradual and the eliminating forces, as a whole, impersonal; that is to say, they are too many, too intangible, to make an impression of wilful personal opposition. Disappointment may ensue, but not hatred; except in the case of weak and abnormally sensitive minds whose uncontrolled emotions lead them to ascribe every painful experience to the malignant purpose of others. So with commercial competition; a man's trade gradually increases or declines; but there is seldom any one person who can be fixed upon as the cause. In fact, while admitting the existence of a great deal of competitive bitterness, I believe that most men look upon the social conditions under which they work very much as the farmer looks upon the weather and other natural agents. They may make or mar him, and he thrives or suffers accordingly, but there is no single person to hold responsible.

It may be maintained that competition, when not unjust or destructive, promotes a broader social feeling. The free and open play of energy and purpose is calculated to arouse precisely that knowledge of others, and of the limitations which their life imposes upon ours, out of which a wholesome sympathy and a sense of justice must spring. Competition involves contact and usually necessitates some degree of mutual comprehension. To succeed one must understand opposing forces, and understanding is the beginning of sympathy.

E. COMPETITION DECIDES THE RIVALRY OF CITIES AND MARKETS[43]

The history of the distribution of the surplus grain from the interior markets at which it has been accumulated to the centers of consumption eastward and southward is summed up in one word—competition. During the past century the main lines of distribution have shifted several times: first, the grain went south by way of the Ohio and the Mississippi rivers, from Cincinnati and St. Louis to New Orleans, thence to the east by coastwise ships; secondly, the opening of the Erie Canal (1825) turned the cereal movement eastward to New York; thirdly, the railroads and the lakes competed for the grain traffic (1860–70); fourthly, the railroads and the Erie Canal kept up a competitive struggle for ten years, and, fifthly, the rise of the southern movement of grain traffic by rail to the Gulf became a permanent factor again.

Besides the competition of railroads with waterways in the distribution of grain and the competition of railroads with one another, a third factor of equal importance enters into this movement—that is, the competition of the seaboard cities for the control of the cereal movement.

On the Atlantic seaboard there are five ports connected by railway lines with the primary grain markets of the interior, either by rail or by water and rail routes. The shortest rail line had formerly been regarded as in the best position to get this traffic from the eastern lake ports to the seaports. This favored carrier was the New York Central; and New York City, by virtue of the Erie Canal, was regarded as naturally entitled to the lion's share of the grain traffic in the East and for export. While this position was conceded by other carriers, it was not accepted as the end of the matter. Other roads, naturally less favored, found in reckless competition a means of wresting concessions from the Central in the form of a differential. This differential was an attempt to equalize the opportunities for getting eastward traffic among the trunk lines, by maintaining lower rates for less favored roads in proportion to the disadvantage of extra rail distance above that of the Central. The differentials granted at first to Boston, Philadelphia, and Baltimore covered disadvantages in exportation also from these ports. Later, this differential was extended to Newport News, as

[43] Adapted from the *Report of the Industrial Commission*, 1900, VI, 111–14, 124.

a means of setting limits to the competitive struggle for a division of traffic among the trunk lines concerned. This arrangement, as a working basis among competing grain lines, began in 1876, and has not since been successfully attacked in principle, though there have been reductions in the amount of the differential. Such seems to be the state of the question as far as it concerns the grain movement to the seaboard cities of the United States.

From the standpoint of the interior cities, competition is quite as keen as it is among the seaboard cities in the distribution of grain.

It seems clear, then, that the existing system of distribution of the visible supply of grain involves three main commercial interests: first, that of the grain-carrying transportation lines; secondly, that of the competitive interior markets at which the movement begins; and, thirdly, that of the seaboard cities at which internal distribution ends. All of these interests act and react one upon another, and the existing system has been wrought out under the impact of their powerful influences.

F. COMPETITION AND FAIR PRICE[44]

The old theory of value was that every article had a just price; that the buyer would naturally try to pay less than that price, the seller to exact more; that whichever man succeeded gained a slight earthly advantage at corresponding peril to his soul—this peril being especially great in the case of the seller, because he was usually more skilful than the buyer and was likely to make this unfair gain a means of livelihood. For the double purpose of protecting the buyer against dangers in this life and the seller against dangers in the life to come, it was habitual for the authorities to fix prices on many of the articles of common use, and to exact severe penalties for any variation from these prices. If the authorities thought that a loaf of bread ought to cost two pence, they set the price accordingly and cut off the ears of the offending baker who should undertake to charge more. Of course the result of this was to fix the price at two pence. No baker was going to jeopardize his soul's salvation and his ears at the same time. The effect of this low price was that the consumers used bread as freely as before, instead of economizing it; and, after a few weeks, in place of

[44] Adapted by permission from A. T. Hadley, *Freedom and Responsibility*, pp. 117–21. (Charles Scribner's Sons, 1903. Author's copyright.)

the slight deficiency of supply which was tending to cause the increase in price, the community found itself face to face with an actual scarcity of the necessaries of life. The artificial system of price regulation had intensified the very evil that it was intended to prevent.

This experience with sales and prices was the basis of the principle of competition, which has taken such a hold on modern industrial life. If the goods are scarce, we let the buyers bid against one another; holding that by this process of selection we shall put such supplies as we have in the place where they are most urgently needed, and shall stimulate real economy in the use of the article by the temporary increase in its price. If the seller thus obtains a considerable gain, we regard this gain as fairly due to his forethought in providing the market with a supply of goods which would otherwise have been absent; and we interfere only when, by some combination or monopoly, he has produced an artificial scarcity instead of helping to meet one which already existed from natural causes. We believe also that the best remedy for a scarcity is to stimulate competition on the part of other producers who will devote their energies toward bringing new supplies to market; and who, if the scarcity is widespread or long continued, will invest new capital in the production of the goods thus urgently needed. We believe that the exceptional profit which these producers obtain until the deficiency of supply has been made good is but a natural and normal means of stimulating them to the utmost exertions in making good the deficiency and of rewarding them for their foresight in doing it rightly.

There can, I think, be no reasonable doubt that the world is far better served under this competitive system than under any other system of industrial regulation which has hitherto been tried. The effect has been so marked that modern law—the English first and the continental afterward—has gradually adjusted itself to the conception that prices should be let alone wherever competition can regulate them; that a price obtained in open market, without fraud or artificial monopoly, is *ipso facto* a fair price; and that a man does no wrong to those with whom he deals if he buys as cheaply as he can and sells as dearly as he can. These legal principles have been reflected in our ethical conceptions. We assume that a competitive price is a morally just price; that what a man can obtain for an article in open market

at the moment represents its present value; and that the average price which he can obtain in the long run represents its true or permanent value.

See also:
"The Church and Its Teachings," page 217.
"Fair Dealing and Fair Price," page 228.

6. THE BRIEF, INCOMPLETE REIGN OF COMPETITION[45]

It would be a great misconception of the actual course of human affairs, to suppose that competition exercises in fact unlimited sway. I am not speaking of monopolies, either natural or artificial, or of any interferences of authority with the liberty of production or exchange. I speak of cases in which there is nothing to restrain competition; no hindrances to it either in the nature of the case or in artificial obstacles; yet in which the result is not determined by competition, but by custom or usage; competition either not taking place at all, or producing its effect in quite a different manner from that which is ordinarily assumed to be natural to it.

Competition, in fact, has only become in any considerable degree the governing principle of contracts at a comparatively modern period. The farther we look back into history, the more we see all transactions and engagements under the influence of fixed customs. The reason is evident. Custom is the most powerful protector of the weak against the strong; their sole protector where there are no laws or government adequate to the purpose. Custom is a barrier which, even in the most oppressed condition of mankind, tyranny is forced in some degree to respect. To the industrious population, in a turbulent military community, freedom of competition is a vain phrase; they are never in a condition to make terms for themselves by it; there is always a master who throws his sword into the scale, and the terms are such as he imposes. But though the law of the strongest decides, it is not the interest nor in general the practice of the strongest to strain that law to the utmost, and every relaxation of it has a tendency to become a custom, and every custom to become a right. Rights thus

[45] Adapted by permission from J. S. Mill, *Principles of Political Economy,* Vol. I, Book II, chap. iv. (D. Appleton & Co., 1893.)

originating, and not competition in any shape, determine, in a rude state of society, the share of the produce enjoyed by those who produce it.

Prices, whenever there was no monopoly, came earlier under the influence of competition, and are much more universally subject to it, than rents: but that influence is by no means, even in the present activity of mercantile competition, so absolute as is sometimes assumed.

The wholesale trade, in the great articles of commerce, is really under the dominion of competition. There, the buyers as well as sellers are traders and manufacturers, and their purchases are not influenced by indolence or vulgar finery, but are business transactions. In the wholesale markets, therefore, it is true as a general proposition that there are not two prices at one time for the same thing: there is at each time and place a market price, which can be quoted in a price-current. But retail price, the price paid by the actual consumer, seems to feel very slowly and imperfectly the effect of competition; and when competition does exist, it often, instead of lowering prices, merely divides the gains of the high price among a greater number of dealers. The influence of competition is making itself felt more and more through the principal branches of retail trade in the large towns; and the rapidity and cheapness of transport, by making consumers less dependent on the dealers in their immediate neighbourhood, are tending to assimilate more and more the whole country to a large town: but hitherto it is only in the great centres of business that retail transactions have been chiefly, or even much, determined by competition. Elsewhere it rather acts, when it acts at all, as an occasional disturbing influence; the habitual regulator is custom, modified from time to time by notions existing in the minds of purchasers and sellers, of some kind of equity or justice.

In many trades the terms on which business is done are a matter of positive arrangement among the trade, who use the means they always possess of making the situation of any member of the body who departs from its fixed customs, inconvenient or disagreeable. All professional remuneration is regulated by custom. The fees of physicians, surgeons, and barristers, the charges of attorneys, are nearly invariable. Not certainly for want of abundant competition in those

professions, but because the competition operates by diminishing each competitor's chance of fees, not by lowering the fees themselves.

Since custom stands its ground against competition to so considerable an extent, even where, from the multitude of competitors and the general energy in the pursuit of gain, the spirit of competition is strongest, we may be sure that this is much more the case where people are content with smaller gains, and estimate their pecuniary interest at a lower rate when balanced against their ease or their pleasure. I believe it will often be found, in Continental Europe, that prices and charges, of some or of all sorts, are much higher in some places than in others not far distant, without its being possible to assign any other cause than that it has always been so: the customers are used to it, and acquiesce in it. An enterprising competitor, with sufficient capital, might force down the charges, and make his fortune during the process; but there are no enterprising competitors; those who have capital prefer to leave it where it is, or to make less profit by it in a more quiet way.

A further discussion of competition may be found in the final chapter of Part III.

F. Social Control, Especially Law and Government

Our discussion of private property, contract, individual initiative, and pecuniary competition showed that these are neither unchanging nor are they separate and distinct from the rest of that body of thought-patterns and guides to action which surround the individual in our society. These, with other institutions, direct and restrain the individual and are used by him. Like other controls, they are what the group permits them to be. Themselves instruments of control, they are none the less subject to control as the attitudes of the group change from time to time.

There are many ways by which the attitudes and usages of the group become effective. Some of these ways are informal; some are formal; and some lie between the two extremes. At one extreme are such ways as customs, tradition, morals, and religion. These, although their rules and principles are not usually set forth in any formal way, shape our thinking and acting although we are not conscious of it, so unobtrusively have they fastened their grip upon us during our early

plastic years. Such forms of social control are accordingly often called "informal" or "unconscious" social controls. Their influence is felt throughout our producing activities. To cite examples of harmful influences, stupid customary business procedures continue to be followed; inconvenient measuring devices like the yard or the ounce are retained. On the other hand, some economy of effort results from following established practices unthinkingly.

At the other extreme are such formal and conscious, or at least semiconscious, ways of control as law and government, which also powerfully affect our organization for production. Law and government forbid certain activities, give aid to others, command still others, and, in the case of government, actually engage in the production of economic goods and services. Law and government (as well as our informal controls) regulate or establish procedures by authority of the group, and they thus aid (as do also informal controls) in the establishment of that certainty of human relationships which is essential to a régime of individual initiative.

In addition to the before-mentioned controls there are many other ways by which group attitudes are made effective.

Each of these ways, formal and informal, progressive and conservative, conscious and unconscious, legal, customary, religious, and traditional, plays an important part in providing the social setting which to such a significant degree conditions our producing activities.

The following selections should be read with these issues[45a] in mind:

1. We speak of our economic order as being one of individual initiative, but can the individual really exercise initiative; can he shake off the thralls of the group?
2. How large does the rational element—the element of scientific thought—seem to be in our social control?
3. Does our industry operate within a fairly rigid framework of social institutions and social control?
4. In particular, does our industry operate within an intricate legal and governmental framework?
5. Have we any "standards" with respect to the "proper sphere" of government; and if we have, whence came they?

[45a] A more detailed statement of issues may be found in *Outlines of the Economic Order*, pp. 80–83. (University of Chicago Press.)

1. CONSCIOUS AND UNCONSCIOUS SOCIAL CONTROL[46]

The first task of life is to live. Men begin with acts, not with thoughts. Every moment brings necessities which must be satisfied at once. Need was the first experience, and it was followed at once by a blundering effort to satisfy it. It is generally taken for granted that men inherited some guiding instincts from their beast ancestry, and it may be true, although it has never been proved. If there were such inheritances, they controlled and aided the first efforts to satisfy needs. Need was the impelling force. Pleasure and pain were the rude constraints which defined the line on which efforts must proceed. Thus ways of doing things were selected, which were expedient. They answered the purpose better than other ways, or with less toil and pain. Along the course on which efforts were compelled to go, habit, routine, and skill were developed. The struggle to maintain existence was carried on, not individually, but in groups. Each profited by the other's experience; hence there was concurrence toward that which proved to be most expedient. Hence the way turned into customs and became mass phenomena. Instincts were developed in connection with them. In this way *folkways arise.* The young learn them by tradition, imitation, and authority. The folkways, at a time, provide for all the needs of life then and there. They are uniform, universal in the group, imperative, and invariable. As time goes on, the folkways become more and more arbitrary, positive, and imperative.

From recurrent needs arise habits for the individual and customs for the group, but these results are consequences which were never conscious, and never foreseen or intended. They are not noticed until they have long existed, and it is still longer before they are appreciated. Another long time must pass, and a higher stage of mental development must be reached, before they can be used as a basis from which to deduce rules for meeting, in the future, problems whose pressure can be foreseen. The folkways, therefore, are not creations of human purpose and wit. They are like products of natural forces which men unconsciously set in operation, or they are like the instinctive ways of animals, which are developed out of experience, which reach a final form of maximum adaptation to an interest, which are handed

[46] Adapted by permission from W. G. Sumner, *Folkways*, pp. 2–6, 28–46, 53–60. (Ginn & Co., 1913.)

down by tradition and admit of no exception or variation, yet change to meet new conditions, still within the same limited methods, and without rational reflection or purpose. *From this it results that all the life of human beings, in all ages and stages of culture, is primarily controlled by a vast mass of folkways handed down from the earliest existence of the race, having the nature of the ways of other animals, only the topmost layers of which are subject to change and control, and have been somewhat modified by human philosophy, ethics, and religion, or by other acts of intelligent reflection.*

The folkways, being ways of satisfying needs, have succeeded more or less well, and therefore have produced more or less pleasure or pain. Their quality always consisted in their adaptation to the purpose. If they were imperfectly adapted and unsuccessful, they produced pain, which drove men on to learn better The folkways are, therefore, (1) subject to a strain of improvement toward better adaptation of means to ends, as long as the adaptation is so imperfect that pain is produced. They are also (2) subject to a strain of consistency with each other, because they all answer their several purposes with less friction and antagonism when they co-operate and support each other. The form of industry, the forms of the family, the notions of property, the constructions of rights, and the types of religion show the strain of consistency with each other through the whole history of civilization. The two great cultural divisions of the human race are the oriental and the occidental. ~~Each is~~ consistent throughout; each has its own philosophy and spirit; they are separated from top to bottom by different mores, different standpoints, different ways, and different notions of what societal arrangements are advantageous.

The folkways are the "right" ways to satisfy all interests, because they are traditional and exist in fact. They extend over the whole of life. There is a right way to catch game, to win a wife, to make one's self appear, to cure disease, to honor ghosts, to treat comrades or strangers, to behave when a child is born, on the warpath, in council, and so on in all cases which can arise. The ways are defined on the negative side, that is, by taboos. The "right" way is the way which the ancestors used and which has been handed down. The tradition is its own warrant. It is not held subject to verification by experience. The notion of right is in the folkways. It is not outside of them, of in-

dependent origin, and brought to them to test them. In the folkways, whatever is, is right. This is because they are traditional, and therefore contain in themselves the authority of the ancestral ghosts. When we come to the folkways we are at the end of our analysis. The notion of right and ought is the same in regard to all the folkways, but the degree of it varies with the importance of the interest at stake. "Rights" are the rules of mutual give and take in the competition of life which are imposed on comrades in the in-group, in order that the peace may prevail there which is essential to the group strength. Therefore rights can never be "natural" or "God-given," or absolute in any sense. The morality of a group at a time is the sum of the taboos and prescriptions in the folkways by which right conduct is defined. Therefore morals can never be intuitive. They are historical, institutional, and empirical. World philosophy, life policy, right, rights, and morality are all products of the folkways. They are reflections on, and generalizations from, the experience of pleasure and pain which is won in efforts to carry on the struggle for existence under actual life conditions. The generalizations are very crude and vague in their germinal forms. They are all embodied in folklore, and all our philosophy and science have been developed out of them.

When the elements of truth and right are developed into doctrines of welfare, the folkways are raised to another plane. They then become capable of producing inferences, developing into new forms, and extending their constructive influence over men and society. Then we call them the mores. *The mores are the folkways, including the philosophical and ethical generalizations as to societal welfare which are suggested by them, and inherent in them, as they grow.*

It can be seen that philosophy and ethics are products of the folkways. They are taken out of the mores, but are never original and creative; they are secondary and derived.

The masses are the real bearers of the mores of the society. They carry tradition. The folkways are their ways. They accept influence or leadership, and they imitate, but they do so as they see fit, being controlled by their notions and tastes previously acquired. They may accept standards of character and action from the classes, or from foreigners, or from literature, or from a new religion, but whatever they take up they assimilate and make it a part of their own mores,

which they then transmit by tradition, defend in its integrity, and refuse to discard again. Consequently, the writings of the literary class may not represent the faiths, notions, tastes, standards, etc., of the masses at all. The literature of the first Christian centuries shows us scarcely anything of the mores of the time, as they existed in the faith and practice of the masses. Every group takes out of a new religion which is offered to it just what it can assimilate with its own traditional mores. Christianity was a very different thing amongst Jews, Egyptians, Greeks, Germans, and Slavs. It would be a great mistake to suppose that any people ever accepted and held philosophical or religious teaching as it was offered to them, and as we find it recorded in the books of the teachers. The mores of the masses admit of no such sudden and massive modification by doctrinal teaching. The process of assimilation is slow, and it is attended by modifying influences at every stage. What the classes adopt, be it good or ill, may be found pervading the mass after generations, but it will appear as a resultant of all the vicissitudes of the folkways in the interval.

Institutions and laws are produced out of mores.—An institution consists of a concept (idea, notion, doctrine, interest) and a structure. The structure is a framework, or apparatus, or perhaps only a number of functionaries set to co-operate in prescribed ways at a certain conjuncture. The structure holds the concept and furnishes instrumentalities for bringing it into the world of facts and action in a way to serve the interests of men in society.

Institutions are crescive or enacted. They are crescive when they take shape in the mores, growing by the instinctive efforts by which the mores are produced. Then the efforts, through long use, become definite and specific. Property, marriage, and religion are the most primary institutions. They began in folkways. They became customs. They developed into mores by the addition of some philosophy of welfare, however crude. Then they were made more definite and specific as regards the rules, the prescribed acts, and the apparatus to be employed. This produced a structure, and the institution was complete.

Enacted institutions are products of rational invention and intention. They belong to high civilization. Banks are institutions of credit, founded on usages which can be traced back to barbarism. There came a time when, guided by rational reflection on experience,

men systematized and regulated the usages which had become current, and thus created positive institutions of credit, defined by law and sanctioned by the force of the state. Pure enacted institutions which are strong and prosperous are hard to find. It is too difficult to invent and create an institution, for a purpose, out of nothing.

Acts of legislation come out of the mores.—In low civilization all societal regulations are customs and taboos, the origin of which is unknown. Positive laws are impossible until the stage of verification, reflection, and criticism is reached. Until that point is reached there is only customary law, or common law. The customary law may be codified and systematized with respect to some philosophical principles, and yet remain customary. The codes of Manu and Justinian are examples. Enactment is not possible until reverence for ancestors has been so much weakened that it is no longer thought wrong to interfere with traditional customs by positive enactment. Even then there is reluctance to make enactments, and there is a stage of transition during which traditional customs are extended by interpretation to cover new cases and to prevent evils. Legislation, however, has to seek standing ground on the existing mores, and it soon becomes apparent that legislation, to be strong, must be consistent with the mores. Things which have been in the mores are put under police regulation and later under positive law. It is always a question of expediency whether to leave a subject under the mores, or to make a police regulation for it, or to put it into the criminal law. Betting, horse racing, dangerous sports, electric cars, and vehicles are cases now of things which seem to be passing under positive enactment and out of the unformulated control of the mores. When an enactment is made, there is a sacrifice of the elasticity and automatic self-adaptation of custom; but an enactment is specific and is provided with sanctions. Enactments come into use when conscious purposes are formed, and it is believed that specific devices can be framed by which to realize such purposes in the society. Then also prohibitions take the place of taboos, and punishments are planned to be deterrent rather than revengeful.

When folkways have become institutions or laws they have changed their character and are to be distinguished from the mores. The element of sentiment and faith inheres in the mores. Laws and institutions have a rational and practical character, and are more me-

chanical and utilitarian. The great difference is that institutions and laws have a positive character, while mores are unformulated and undefined. There is a philosophy implicit in the folkways; when it is made explicit it becomes technical philosophy. Objectively regarded, the mores are the customs which actually conduce to welfare under existing life conditions. Acts under the laws and institutions are conscious and voluntary; under the folkways they are always unconscious and involuntary, so that they have the character of natural necessity.

We may now formulate a more complete definition of the mores. They are the ways of doing things which are current in a society to satisfy human needs and desires, together with the faiths, notions, codes, and standards of well living which inhere in those ways, having a genetic connection with them.

2. INFORMAL SOCIAL CONTROL

A. GENERAL STATEMENT[47]

Informal social control is exercised chiefly through (1) custom, (2) public opinion, (3) conscience, (4) religion. These no doubt tend to overlap and pass over into each other, but we may distinguish them broadly.

Custom stands for the conformity of the individual to the traditional and general ways of acting in some group. Its agencies are imitation and suggestion, positive drill or ritual, conscious desire to be like others of our group and not "queer" or "outlandish." It thus governs in the relatively stable external and general aspects of conduct.

Public opinion expresses the more conscious active and adjustable constraint. It acts through direct praise or blame or through the remoter rewards and penalties. It stamps some as "having gained success," others as "failures." It awards to some public office, to others business popularity, to others social distinction. It defeats the unpopular candidate, ruins financially the disliked business, ostracizes socially the man who violates the code of club or class. It is typically represented by the "honorable" and "dishonorable."

Conscience stands for a more penetrating, careful, and disinterested judgment than public opinion. It professes to be guided by

[47] Prepared by J. H. Tufts.

standards more permanent than those of shifting favor. When it pronounces conduct right or wrong it looks at motives or results more searchingly, and when it speaks of "duty" to creditors, to fellow-workmen, to employer, to employee, to family, or to the community it implies a set of personal relations in which the individual is placed, and which he may not break. Just why he ought to keep his word, to be honest, to care for his children, to stand by his union, he may not be able to state; but he feels the tug of forces binding him closely to those with whom he is in constant relation, feebly to those of a different class or race or living at a distance.

Religion embodies a conviction that the universe is not a mere machine but is on the side of right and good, and will not suffer wrong finally to triumph or evil to prevail. It embodies men's demands for a fairer tribunal, a more just order of society, a larger scope of opportunity than falls to the human lot here. It adds a higher authority to conscience. It gives a more personal symbol for the unity among men when it calls them sons of one god and therefore brothers of a spiritual kindred.

All these controls of custom, public opinion, conscience, and religion have periods of relative strength and times of relative weakness. The former are likely to coincide with simplicity of racial elements, fixity of social classes, continuity of industrial practices and economic status, persistence of political power, and an absence of any striking discoveries or inventions. Weakness comes when races mingle, bringing conflicting customs, or when old customs no longer meet new economic situations; when classes break down and new ambitions are born among those hitherto accepting their status passively or as part of a providential order; when existing governments are overthrown and new groups gain power; when new economic forces upset older ways of distribution; when new discoveries in science compel new conceptions of the universe.

B. THE NATURE AND IMPORTANCE OF HABIT[48]

When we look at living creatures from an outward point of view, one of the first things that strikes us is that they are bundles of habits. In wild animals, the usual round of daily behaviour seems a necessity

[48] Adapted with permission from William James, *Principles of Psychology*, pp. 104–21. (Henry Holt & Co., 1890.)

implanted at birth; in animals domesticated, and especially in man, it seems, to a great extent, to be the result of education. The habits to which there is an innate tendency are called instincts; some of those due to education would by most persons be called acts of reason.

We may trace some of the practical applications of the principle to human life.

The first result of it is that *habit simplifies the movements required to achieve a given result, makes them more accurate and diminishes fatigue.*

Man is born with a tendency to do more things than he has ready-made arrangements for in his nerve centres. Most of the performances of other animals are automatic. But in him the number of them is so enormous, that most of them must be the fruit of painful study. If practice did not make perfect, nor habit economize the expense of nervous and muscular energy, he would therefore be in a sorry plight.

The next result is that *habit diminishes the conscious attention with which our acts are performed.* When we are learning to walk, to ride, to swim, skate, fence, write, play, or sing, we interrupt ourselves at every step by unnecessary movements and false notes. When we are proficients, on the contrary, the results not only follow with the very minimum of muscular action requisite to bring them forth, they also follow from a single instantaneous "cue." The marksman sees the bird, and before he knows it, he has aimed and shot. A gleam in his adversary's eye, a momentary pressure from his rapier, and the fencer finds that he has instantly made the right parry and return.

Habit is thus the enormous fly-wheel of society, its most precious conservative agent. It alone is what keeps us all within the bounds of ordinance, and saves the children of fortune from the envious uprisings of the poor. It alone prevents the hardest and most repulsive walks of life from being deserted by those brought up to tread therein. It keeps the fisherman and the deck-hand at sea through the winter; it holds the miner in his darkness, and nails the countryman to his log-cabin and his lonely farm through all the months of snow; it protects us from invasion by the natives of the desert and the frozen zone. It dooms us all to fight out the battle of life upon the lines of our nurture or our early choice, and to make the best of a pursuit that disagrees, because there is no other for which we are fitted, and it is too late to

begin again. It keeps different social strata from mixing. Already at the age of twenty-five you see the professional mannerism settling down on the young commercial traveller, on the young doctor, on the young minister, on the young counsellor-at-law. You see the little lines of cleavage running through the character, the tricks of thought, the prejudices, the ways of the "shop," in a word, from which the man can by-and-by no more escape than his coat sleeve can suddenly fall into a new set of folds. On the whole, it is best he should not escape. It is well for the world that in most of us, by the age of thirty, the character has set like plaster, and will never soften again.

C. PUBLIC OPINION[49]

Genuine opinion is neither cold, logical judgment nor irrational feeling. It is scientific hypothesis, to be tested and revised as experience widens. Opinion is a view of a situation based on grounds short of proof. In a valid opinion they must be *just* short of proof. Good opinion is not spasmodic. The mind must have made a very wide sweep, made the complete circuit of the compass. It must first have hunted down the predisposing prejudice and neutralized it and then bent itself to discovering all the factors that converge upon the situation. But good opinion is not flabby or uncertain. It is not a "much to be said on both sides." It is a provisional conviction to be held as a conviction until new light alters it. It strains constantly toward truth. It invites criticism. It has the scientist's disinterestedness in its own conviction. What it wants is to understand, to get the thing it is judging rightly placed, to grasp its true meaning in the world.

Opinion, however, aims not at a mere static comprehension. It is a force, and the only force that can be relied upon in the long run to fortify the will and clear the vision. Conviction, gripped after the widest possible survey of the field, is what we must act upon if we are to effect those social changes which most of us desire. The world has generally preferred to act from logical consistency or from the high elation of feeling, rather than upon daring and clear-sighted experiment. The idea of a social and political opinion which, free from moral prejudice, strains toward scientific proof, as the hypotheses of

[49] Adapted by permission from an editorial in the *New Republic,* IV (1915), 171–72.

the physicist strain toward physical laws, is still very new, but it is already playing havoc with the old, crusted folkways.

If such opinion is to be the force of the future, there cannot be too much of its guiding thread. Yet it constantly becomes not easier but harder to form valid opinions. We are stunned by the volume of what there is to know in the human world.

D. TRADITION AND SOCIAL INHERITANCE[50]

Tradition is, in the development of society, what heredity is in the physical growth of the stock. It is the link between past and future, it is that in which the effects of the past are consolidated and on the basis of which subsequent modifications are built up. We might push the analogy a little farther, for the ideas and customs which it maintains and furnishes to each new generation as guides for their behavior in life are analogous to the determinate methods of reaction, the inherited impulses, reflexes, and instincts with which heredity furnishes the individual. The tradition of the elders is, as it were, the instinct of society. It furnishes the prescribed rule for dealing with the ordinary occasions of life which is for the most part accepted without inquiry and applied without reflection. It furnishes the appropriate institution for providing for each class of social needs, for meeting common dangers, for satisfying social wants, for regulating social relations. It constitutes, in short, the framework of society's life which to each new generation is a part of its hereditary outfit.

But of course in speaking of tradition as a kind of inheritance we conceive of it as propagated by quite other than biological methods. In a sense its propagation is psychological, it is handed on from mind to mind, and even though social institutions may in a sense be actually incorporated in material things, in buildings, in books, in coronation robes, or in flags, still it need not be said that these things are nothing but for the continuity of thought which maintains and develops their significance. Yet the forces at work in tradition are not purely psychological; at least, they are not to be understood in terms of individual psychology alone. What is handed on is not merely a set of ideas, but the whole social environment; not merely certain ways of

[50] Taken by permission from L. T. Hobhouse, *Social Evolution and Political Theory*, pp. 33–36. (Columbia University Press, 1911.)

thinking or of acting, but the conditions which prescribe to individuals the necessity for thinking or acting in certain specific ways if they are to achieve their own desires.

3. LAW IN SOCIAL CONTROL

A. THE LEGAL FRAMEWORK OF INDUSTRY[51]

Classification of legal adjustments.—Industrial laws and customs are of two general sorts according to the authority upon which they rest. They are either facts of history, like the absence of slavery or the institution of private property, or they are laws passed by some legislative body which prescribe the conditions under which men may work. The following is a classification of those laws and rules of conduct which make up the background of our industrial society.

ANALYSIS OF THE LEGAL FRAMEWORK OF INDUSTRY

- Legal framework of industry
  - I. Primary rights that rest on history
    - 1. Law of property
      - a. Property in land
      - b. Property in capital
      - c. Property in organization
      - d. Property in consumable goods
    - 2. Law of person
      - a. Individual freedom
      - b. Equality of opportunity
      - c. Number and movement
      - d. Voluntary association
  - II. Secondary rights that rest on acts of government
    - 1. Rules imposing conditions of work
      - a. Laws which prescribe conditions
      - b. Laws which provide for supervisory control
      - c. Laws which provide for administrative control
    - 2. Government as protector
      - a. Protection against aggression from without
      - b. Protection from violence within
      - c. Enforcement of legal contracts

The law of property.—The necessity of a law of property of some sort is an eternal necessity. No society, at least no industrial society that puts into practice the principle of division of labor, can exist without a law of property. The important fact about property is that it gives control over the thing owned. It gives someone the right to say where and how a thing is to be used. Under no other conditions will free men consent to work.

[51] H. C. Adams, *Description of Industry*, pp. 34–53. (Henry Holt & Co., 1918.)

According to our system of law, men may become proprietors of the instruments of production and are acknowledged owners of the products that result from the use of these instruments. They may buy and sell as they see fit those things which they own, and in every way control their use except it be that in their use they do something contrary to the interest of the public as a whole. From this it is evident that the institution of private property has given to men that liberty of action and control over work to which history gives the name of industrial freedom. The present law recognizes property in land, property in capital, property in organization, and property in consumable goods.

The law of personal liberty.—The social aim of the English speaking people, as disclosed by their history, is the realization of personal liberty.

The rights conferred and the duties imposed by what is sometimes called the law of persons, so far as they pertain to industrial affairs, may be grouped under the following heads: individual freedom, equality of opportunity, number and movement, and voluntary association.

a) *Individual freedom.*—A study of the growth of industry shows three conditions under which the great body of workers have been obliged to work:—first, that of slavery; second, that of serfdom; and third, that of freemen working for wages. The class of workers to whom this generalization applies are commonly called laborers, and that word will be used in what follows.

By contrast with the slave and the serf, the *laborer* of today is a workman who stands before the law as any other worker. If one must speak of laborers in the language of property, the modern laborer owns himself and the law does not permit him to part with that ownership. So far as the law is concerned, there is no labor class. All men are equal before the law. No man is compelled by law to be a laborer. This is our first important lesson.

When, however, one observes the situation as it is in the modern business world, he is obliged to recognize a labor class, and to acknowledge that this fact gives character to modern industry. The labor class of to-day is composed of freemen who work for wages. It is a wage earning class, and the peculiar fact respecting it is that laborers have no property in the instruments of production.

b) *Equality of opportunity.*—It lies in the theory of industrial law that all men shall be granted the same opportunity of industrial success. This is attained by the abolition of classes, so far as classes are recognized by law. In the modern world, no legal privilege is conferred by the accident of birth. There are no industrial rules which limit men in their choice of a place in industry. Every profession, trade, or line of business, opens its doors to the choice of industrial freemen. The industrial theory which springs out of this fact of law is that, through freedom of opportunity, society as well as individual workers will reap the highest possible benefits. It assumes that, under equal opportunity, every worker will do the best possible for himself, and that in so doing he will contribute in the highest degree possible to the well-being of all workers.

c) *Numbers and movement.*—Among the technical rights conferred by the modern system of law, are the right of marriage and the right of migration. The point here to be noted is that, in so far as numbers influence in any way the character of industrial society, the law refrains from exercising any control.

For the United States, this right of migration within the jurisdiction of the Federal government is guaranteed by the Constitution. Certain important results flow from this well-established fact. It gives what is termed mobility to capital and to labor. The distribution of industry throughout the country is determined by the choice of men who control the capital, and, consequently, what is termed the industrial development of the nation, so far as the spread of industry is concerned, is free from the dictation of the law.

The fact that laborers have the right to migrate from place to place carries with it another significant result. If wages are high in one locality and low in another, the tendency will be for laborers to migrate from the place where wages are low to the place where wages are high. This means that the labor market is nation wide. Not only does it tend to equalize wages between different parts of the country, but it makes it possible for industries to plant themselves where the natural conditions are the most inviting. For a variety of reasons, laborers do not readily move from place to place, but, so far as the law is concerned, the right of such movement is fully guaranteed. This,

also, is a fact of immense importance to the student who desires to understand modern industrial society.

d) *Voluntary association.*—An important corollary of industrial freedom is the right of contract. Workers of all classes are at liberty to enter into any industrial arrangement they may agree upon, provided such agreement is not contrary to the public interest. An important industrial fact is that the co-operation of workers, to which reference was made in the first chapter, is realized through the exercise of the right of contract. The right of contract is an expedient provided by the law in order that men may choose freely what they will do and how they will do it. All arrangements for co-operative work, whatever they may be, stand before the law as voluntary associations. They are associations entered into voluntarily by men who are free to make contracts.

Statutes imposing conditions of work.—In the foregoing discussion, attention was called to the fact that the results of industrial freedom as we see them to-day, do not in all respects harmonize with the idea that lies back of the legal system by which that freedom is conferred. This should not be the occasion of surprise. A system of law which confers equal opportunities upon men who are not equal in strength, in skill, or in the amount of education they are able to acquire, cannot produce equal results. Nevertheless, the purpose of the law is firmly held as the purpose for which government should strive, and it is the result of this striving that one reads in the industrial statutes of the day. There purpose is the elimination of the evils which spring from competition, and the subjection of the exercise of freedom to such restraints that equality of results, as well as of opportunity, may be realized, so far as this can be done without impairing the efficiency of work.

Three kinds of laws or groups of enactments may be named which hold this end in view. These are: laws which prescribe conditions, laws which provide for supervisory control, and laws which provide for administrative control.

Government as protector.—It is not correct to say that the government has no part in industry. On the contrary, a just and strong government is the most important single fact for the attainment of industrial success. History does not provide a single case of a flourish-

ing industry under a corrupt or weak government; but it furnishes many illustrations of fields unworked, and of industries falling into decay, because workers were deprived of the protection of strong and just governments. Government as a protector is an essential condition of an effective and progressive business community. It is in this sense that we include the protective function of government as a part of the legal framework of industry.

The protective functions of government of importance to industry are: protection against aggression from without, protection from violence within, and enforcement of contracts.

B. STATUTE LAW AND COMMON LAW[52]

We commonly speak both of law and of laws, and these terms, though not used with precision, point to two different aspects under which legal science may be approached. The laws of a country are thought of as separate, distinct, individual rules; the law of a country, however much we may analyse it into separate rules, is something more than the mere sum of such rules. It is rather a whole, a system which orders our conduct; in which the separate rules have their place and their relation to each other and to the whole.

There is also a more precise way in which we use this distinction between law and laws. Some laws are presented to us as having from the beginning a separate and independent existence; they are not derived by any process of analysis or development from the law as a whole. We know when they were made and by whom. Such laws in this country are for the most part what we call statutes; collectively they are spoken of as Statute Law. On the other hand, putting aside for the present the rules of Equity, the great body of law which is not Statute Law is called the Common Law. The Common Law has grown rather than been made. We cannot point to any definite time when it began; as far back as our reports go we find judges assuming that there is a Common Law not made by any legislator. When we speak of *the* law we are thinking of the system of law which includes both Statute and Common Law, perhaps more of the latter than of the former. A rule of the Common Law would rarely, if ever, be spoken of as *a* law.

[52] Adapted by permission from W. M. Geldart, *Elements of English Law,* pp. 7–13. (Henry Holt & Co., Williams & Norgate.)

In spite of the enormous bulk of the Statute Law, the most fundamental part of our law is still Common Law. No statute, for instance, prescribes in general terms that a man must pay his debts or perform his contracts or pay damages for trespass or libel or slander. The Statutes assume the existence of the Common Law; they are the addenda and errata of the book of the Common Law; they would have no meaning except by reference to the Common Law.

On the other hand, where Statute Law and Common Law come into competition, it is the former that prevails.

How do we know the law? Here there is a great difference between Statute and Common Law. A statute is drawn up in a definite form of words. On the other hand, we have no authoritative text of the Common Law. There is no one form of words in which it has as a whole been expressed at any time. Therefore in a sense one may speak of the Common Law as unwritten law in contrast with Statute Law, which is written law. Nevertheless, the sources from which we derive our knowledge of the Common Law are in writing or print.

C. LEGAL INTERVENTION IN BUSINESS[53]

Legal intervention in business analyzed.—A business man may be thinking of taking some action, or he may be inactive and someone may be trying to get him to act. To know whether the action contemplated or requested shall be taken requires that the business man know what rules of law are applicable to the act in question. After he has decided whether or not the action will be possible or profitable he must yet decide what the legal consequences of his acting or refusing to act will be. Depending upon the nature of the act involved, the law may say to him one of three things: (1) "You shall not do it." (2) "Do it or not, as you like. If you decide to do it, I will help you." (3) "You shall do it."

Prohibitive intervention.—The law often intervenes in affairs of men to prohibit certain acts and conduct. The thing prohibited may be so detrimental to the public if permitted that the public, through its organized representative, the state, labels it criminal and punishes the offender with death, imprisonment, or fine. The principal crimes have been classified as follows: (1) Offenses against the government,

[53] Prepared by Herman Oliphant.

including treason, bribery, extortion, maintenance, perjury, and contempt; (2) offenses against the public peace and welfare, including affray, riot, libel and slander, nuisance, and conspiracy; (3) crimes against religion and morality, including blasphemy, adultery, bigamy, and kidnapping; (4) offenses against the person, including assault, homicide, and robbery; (5) offenses against property, including arson, burglary, larceny, embezzlement, cheating, forgery, and counterfeiting. Those crimes of prime importance to the business man are: libel and slander, conspiracy, embezzlement, cheating, and forgery.

Besides conduct contrary to morals, that contravening public policy is condemned, though not of sufficient seriousness to constitute a crime. Reprehensible conduct, short of crimes, usually takes one of two forms: torts, or illegal contracts. Public policy requires the protection of certain interests. They may be the interests of the individual, of society as a whole, or of the state as a representative of society. The law intervenes if I insist upon mashing your nose or destroying your reputation by defamation. Marriage-brokers' contracts and contracts or gifts whose effects are to restrain marriage are not valid. I must not make a highway of your lawn or otherwise lessen the value of your enjoyment of any property that is yours. One cannot enforce a promise to pay a bribe or a contract to lobby for a legislative measure. The social interests which are protected are enormous in number and happily increasing. To take examples from a single field, that of economic interests, the body of law rendering futile contracts in restraint of trade is both enormous and adolescent, while, to the question what means are fair and foul in the bargaining struggle between employers and employees and in contracts between trade rivals, the answer which the law will finally return will doubtless be as complex as it is now uncertain.

There are many ways by which the law's disapprobation of conduct is expressed. The most obvious one is to give the public a remedy in the form of a criminal prosecution, as was done by the Sherman Act. More effectual, because put into the hands of the individual who has been harmed, is its civil action for damages. To enforce contracts, elaborate and expensive legal machinery has been provided. In a multitude of cases the law makes real its dislike of certain conduct by refusing the wrongdoer the use of this machinery.

Promotive intervention.—The second type of legal intervention is promotive in its purpose. To promote the exchange of commodities, for example, certain promises concerning it are sanctioned by the law and their performance is made obligatory. To promote commerce the law permits and aids a railroad to take private property with or without the owner's consent.

Incidentally for the good of the individuals concerned, but primarily for the good of society as a whole, the law sanctions among other things promises which people have procured. What promises the law by its sanction requires to be performed depends both upon their content and form. The promise must relate to something of general importance to be thus dignified by the law. In general, promises relating to trade and commerce are binding. Promises to dine are not. Promises to marry are. Again, I may want to make a promise to you without making myself liable to have to perform it. It is therefore desirable that we shall be able to make our promises binding or not as we wish. The difference is one of form. Unless the promise takes a certain form the law will not enforce it.

Ordinarily, I cannot be compelled to sell property which I own. It cannot be taken from me without my consent. Yet a corporation, in undertaking to build a bridge or a railroad, may need land which I own. To such corporations the law-makers may give the privilege of taking my land without my consent. A group of men desire to form a business organization that will continue though one of them dies, and for whose obligations the members will not be liable beyond the amounts which they have put into the business. These powers and privileges are often conferred by the legislature upon groups of individuals.

Mandatory intervention.—Over against the inhibitory functions of the law, which were discussed under the head of Prohibitive Intervention, stand its accelerative functions, less numerous, but no less interesting. Usually whether I shall enter into a contract with you is a matter solely for my determination. If I sell food, I may refuse to sell bread to X because his head is bald, to Y because he eats with his knife, or to Z because he believes in ghosts; and this though each is starving. I may sell at any price I please, and I may charge one man half the value of the bread while I charge another double its worth. I may close my shop whenever it suits my fancy to do so, for any rea-

son or for no reason at all. But if my business is that of a carrier of goods or passengers, or that of an innkeeper, or if I sell gas, water, or electricity instead of bread, ordinarily I may do none of these things. Upon persons or firms engaged in some businesses the law imposes affirmative duties that they shall deal with all proper persons who are willing to pay prices which the law has said are reasonable, and that they shall make no discriminations that are unreasonable. Such businesses, moreover, may not be forsaken at will. While in most businesses, the owners may fix the amount and kind of property which they use, the owners of railroads, for example, must if necessary buy more cars and engines. Telephone companies must lay more cables if the growth of the demand for telephones requires it. To enforce these affirmative duties imposed by the law two principal remedies exist: the person who has been injured by the failure of the owners to perform these duties may sue them and collect for his injury; or he may require some officer of the state, usually the attorney general, to bring action to compel the owners to perform their duties.

Promotive intervention is unlike prohibitive intervention in that it is always the purpose of the latter to prevent action, while the former contemplates action and change.

D. THE FIELD APPROPRIATE TO LAW[54]

The law is but one of various means of control.—There are other means of control such as religion, superstition, ethical teaching, public opinion, etc. Men use physical force, persuasion, education, social ostracism, boycott, blacklist, all sorts of economic, political, and social pressure—court, legislature, school, press, pulpit, platform, market, bank, factory, etc. in the effort to make other men do as they wish. Every man and every group of men is constantly striving consciously or unconsciously, effectively or ineffectively, to control the world in his or its interest. *The law molds human conduct by means of the organized application of physical compulsions to the persons or property of the people. It is a massive, external, tangible control.*

Law too costly to be used to enforce the whole moral law.—Which forms of control should be used in any particular case or class of cases depends on the nature and training of the persons to be controlled and

[54] Adapted by permission from Frank Parsons, *Legal Doctrine and Social Progress*, pp. 17–23. (B. W. Huebsch, 1911.)

the peculiar circumstances, especially in relation to cost, certainty, directness, definiteness, and practicability. It costs a great deal in time, money, and friction to set the cumbrous machinery of the law in motion and to carry it through to judgment and execution; to use that method of control for small offenses against the moral law, such as ordinary lying, explosions of ill-temper, common breaches of courtesy, etc., would be to incur far greater evils than those intended to be repressed. Such offenses should be dealt with by public opinion and the inner ethical control, which work with the minimum cost and the maximum of effectiveness.

The law draws the line at the average man.—It would be folly to attempt to use the law to punish the ordinary shortcomings of the average man. Any system of law that would make the mass of human conduct subject to suit or prosecution, or bring the mass of men into court, or make them liable to be brought into court, would be simply intolerable. The law may be used to punish the sins of our savage blood, to press the defective classes into shape, and bring the lagging minority up to the average standard. But the common sins of the average man should be left to education, public opinion, and the complex mass of family and social influences that are gradually molding human nature to higher and higher types. The law draws a broad line at the average level civilization has attained: it requires only good faith and due care, that is, the degree of honesty, care, and skill which an ordinary man would exercise under similar circumstances. It does not require the honesty, skill, and care exhibited by the best (a rule which would subject the bulk of mankind to legal liability and prosecution), but only demands the virtue of the man of ordinary character, intelligence, and care. The moral law requires of all the conduct of the best and more; but the civil law demands only the goodness of the average type.

The law waits for crystallized public opinion.—So again uncertainty as to the character of the act, or the proof of it, may bar the law as a remedy. Society is not yet agreed that the use of intoxicants (I am not referring to the organized liquor traffic), narcotics, or drugs, stock speculation, sensational journalism, or useless duplication of industries, stores, factories, etc., is immoral; the legal presumption is always with liberty till experience makes it clear, beyond a reason-

able doubt, that the conduct in question is against the interests of society. Till then the matter should be left to ethical discussion, to the pressure of public opinion and its allies.

The law enters only where proof is possible.—Where the facts are difficult of proof, the law is equally excluded. Neither is it adapted to deal with sins of envy, jealousy, overeating, vices of secret character, etc. In the field of evidence the law draws broad lines. It will not deal with evils that in their nature are generally incapable of clear proof. It puts up the bars against hearsay evidence. It requires a witness to tell what he knows of his own knowledge, not what he infers from what he has heard others say. It requires the best evidence the nature and circumstances of the case permit.

4. GOVERNMENT IN SOCIAL CONTROL

A. FUNCTIONS OF GOVERNMENT AS SEEN BY THE CLASSICAL SCHOOL[55]

All systems either of preference or of restraint being thus completely taken away, the obvious and simple system of natural liberty establishes itself of its own accord. Every man, as long as he does not violate the laws of justice, is left perfectly free to pursue his own interest his own way, and to bring both his industry and capital into competition with those of any other man, or order of men. The sovereign is completely discharged from a duty, in the attempting to perform which he must always be exposed to innumerable delusions, and for the proper performance of which no human wisdom or knowledge could ever be sufficient; the duty of superintending the industry of private people, and of directing it towards the employments most suitable to the interest of the society. According to the system of natural liberty, the sovereign has only three duties to attend to; three duties of great importance indeed, but plain and intelligible to common understandings: first, the duty of protecting the society from the violence and invasion of other independent societies; second, the duty of protecting, as far as possible, every member of the society from the injustice or oppression of every other member of it, or the duty of establishing an exact administration of justice; and, third, the duty of erecting and maintaining certain public works and certain public in-

[55] From Adam Smith, *The Wealth of Nations,* Book IV, chap. ix.

stitutions, which it can never be for the interest of any individual or small number of individuals to erect and maintain; because the profit could never repay the expense of any individual or small number of individuals, though it may frequently do much more than repay it to a great society.

B. MODERN STATEMENT OF THE FUNCTIONS OF GOVERNMENT[56]

The functions of the state may be classified as: first, those which are necessary; second, those which are natural or normal, but not necessary; and third, those which are neither natural nor necessary, but which, in fact are often performed by modern states. The last are described by some writers as "doubtful" functions.

1. What are called the essential, normal, or constituent functions are such as all governments must perform in order to justify their existence. They include the maintenance of internal peace, order, and safety; the protection of persons and property; and the preservation of external security. They are the original primary functions of the state, and all states, however rudimentary and undeveloped, attempt to perform them. They embrace the larger part of the activities of the state and have to do principally with the conservation of society and only secondarily with social progress.

2. By natural but unnecessary functions are meant those which the state may leave unperformed or unregulated without abandoning a primary duty or exposing itself to the dangers of anarchy, but which would be neglected, or at least not so well performed, by private enterprise. Among such functions may be mentioned the operation of the postal service; the construction of dikes, levees, canals, public roads, bridges, and irrigation works, and works of public utility generally; the maintenance of scientific and statistical bureaus; the erection and maintenance of lighthouses, beacons, and buoys; the construction of harbors, wharves, and other instrumentalities of trade and commerce; the care of the poor and helpless; the protection of the public health and morals; elementary education; the regulation of many trades, businesses, and occupations, which are affected with a

[56] Adapted by permission from J. W. Garner, *Introduction to Political Science*, pp. 318–20. (American Book Co., 1910. Author's copyright.)

public interest; and the conduct of various undertakings which would be unprofitable as private ventures, but which are required by the common interest.

3. Among the activities of the state which are neither essential nor natural, but which are not a matter of indifference to the public, and which are performed by some states as well as by private enterprise, and at less cost, there are a great variety of services, mainly economic and intellectual, such as: the conduct of railway traffic; the telegraph and telephone service; the manufacture and distribution of gas and electricity for lighting purposes; the furnishing of water for drinking and other purposes in cities; the maintenance of theatres, pawn-shops, bath houses and lodging houses; the encouragement of certain industries by means of bounties, protective tariffs, and subventions; the planting of colonies; the encouragement of immigration; the establishment of experiment stations, liquor dispensaries, banks, universities of learning, hospitals, reformatories, art galleries, museums, zoölogical and botanical gardens; the erection of improved dwellings for working people; the making of loans to farmers; grants in aid of railroads; the distribution of seeds for agricultural purposes; the conduct of the business of insurance; the granting of old age pensions; the maintenance of employment bureaus; and many other activities too numerous to mention. Under this head also may be included a great volume of regulatory or restrictive legislation dealing with the conduct of certain trades and occupations which are affected with a public interest, such as: railway traffic and means of communication; mining, manufacturing; the relations between employer and employees; the conduct of dangerous, offensive, or obnoxious trades; the censorship of the press, vaccination, quarantine, and sanitary legislation; laws regarding the erection of buildings in cities; laws regulating banking, barbering, baking, plumbing, pawnbroking, slaughtering, and many other trades or businesses.

The first group of activities described above represent, according to the individualistic theories, all the activities that the state ought to undertake. Anything more is superfluous and involves an infringement upon the rights and liberties of the individual and cannot therefore be justified.

C. THEORIES CONCERNING GOVERNMENTAL INTERVENTION[57]

What attitude must the government adopt toward the suffering and sorrow, the distress and poverty that everywhere abound? Many different answers are given to this question; but all of them may be reduced under five heads.

1. The first answer is that government, in the discharge of both its legislative and its administrative duties, ought simply to go on as it is doing at present. Evils should be dealt with piecemeal as they arise. In this view all *systems* are misleading. The only guide is common-sense. There is no use of making generalizations at all, for each evil has its own special causes, and must be considered by itself.

2. The second answer to the question is that of the Socialist—let the government step in boldly and undertake far more than it does at present—let it, in fact (say extreme votaries of this doctrine), regulate *everything*. The evils complained of are due in great measure to the free play of the unrestrained evil passions of individuals. Government ought, by force, if necessary, to hold these in check, and it would then become a kind of terrestrial Providence whose duty would be to remedy every ill that flesh is heir to. It would in particular supersede the evils of competition and the unequal distribution of wealth, by regulating all trade and industry by a central system of control. It would own all land, railways, machinery, and, in short, all property of every kind—leaving only the rights of use to the private citizen.

3. A third opinion is the direct opposite of this. Existing evils, which are by their nature remedial, so far from being curable by government intervention, are directly caused by it. Government has no business to meddle with things outside its proper province, and that is at best a very narrow one. In whatever direction the State carries its well-meant but fussy interference with private interests, it does harm.

4. The fourth view tries to distinguish between the provinces of the individual and of the State. The latter lies, as it were, round the centre of the circle, which each social atom has his individual sphere somewhere near the circumference. Thus, the respective fields of State-action and of individual-action are mutually exclusive. To say

[57] Adapted by permission from W. S. M'Kechnie, *The State and the Individual,* pp. 164–69. (James MacLehose & Sons, 1896.)

that anything is a matter for the individual to decide is, in this view, equivalent to saying that the government has no right or, at any rate, no business to interfere. A hard-and-fast boundary line exists somewhere, and the problem is to discover it.

5. There is yet another solution which rejects all these views equally. This fifth theory, then, asserts that no province can be found which is absolutely that of the State, in the sense of excluding individual action, while equally there is no province of the isolated subject which absolutely excludes the government. The individual finds his sphere to be no narrower than the State itself, while the sphere of the government may be logically extended to embrace all the interests and actions of every man and woman. This is the theory of organic unity, which holds it absurd to draw a line between two things whose essential nature lies in their connection with each other.

This fifth solution of the problem, which is here taken to be the only sound one, differs from all the others. It differs from the first in condemning the policy of mere drifting with the current, without formulating principles of guidance and without listening to the voice of science. It condemns the treatment of each case as an isolated problem, and the see-saw inconsistent policy that results—one thing straggling in one direction, while its fellow drifts in the other. Every act of policy must be ultimately judged by the final end of the State itself, and by those approved minor ends which political science has declared to be for the time consistent with, and conducive to, that higher goal. Thus a principle of order is introduced.

It also differs from the socialistic plan. For, though it concedes that the government *may* be lawfully and justly endowed with powers to do everything, it admits no absolute presumption in favour of community of property or of government interferences as opposed to private initiative.

It differs from Individualism in refusing to admit the truth of any philosophy which would find man's highest good apart from his fellow-men, and because it refuses to admit any absolute limits to the action of the central authority acting for the good of the whole.

It differs from those who would effect a compromise between the last two theories, because it cannot admit any distinct province of the man apart from the State. It does not look on the government and the

subject as two unconnected principles which approach each other from opposite sides, and it does not try to allocate the sum of human interests between them, settling by a contract or compromise that everything on this side of an imaginary line goes to the one party and everything on that side to the other.

See also:

"Mercantilism," page 236.

"The Mercantile Regulations Become Onerous," page 238.

"The Transition to Laissez Faire," page 239.

"The Natural Rights Philosophy which Lies behind Laissez Faire," page 241.

"Remedies for Certain Common-Law Doctrines, page 640.

"Social Insurance," page 644.

"Labor Legislation in One State," page 648.

"Some International Aspects of Labor Legislation," page 652.

5. RADIANT POINTS OF SOCIAL CONTROL[58]

A control that we have any right to call *social* has behind it practically the whole weight of society. But still this control often wells up and spreads out from certain centers which we might term *the radiant points of social control.* The question before us is: What is the ultimate seat of authority? Where resides the will that guides the social energies? Who holds the levers which set in motion the checks that hold a man back or the stimuli that push him on?

That frequently these checks and stimuli are managed by a rather small knot of persons should not for a moment lead the reader to confuse social control with class control. Totally different from class control in origin is the power of a minority to direct social control. *Social power is concentrated or diffused in proportion as men do or do not feel themselves in need of guidance or protection.* When it is concentrated it is lodged in that class of men in which the people feel the most confidence. The many transfer their allegiance from one class to another—from elders to priests, or from priests to savants—when their supreme need changes, or when they have lost confidence in the

[58] Adapted by permission from E. A. Ross, "Social Control," *American Journal of Sociology*, VI (1900–1901), 238–45.

old guidance. When they begin to feel secure and able to cope with evils in their own strength and wisdom, the many resume direction of themselves and the monopoly of social power by the few ceases.

Such is the underlying law of the transformations and displacements of power. The immediate cause of the location of power is prestige. The class that has the most prestige will have the most power. The prestige of *numbers* gives ascendancy to the crowd. The prestige of *age* gives it to the elders. The prestige of *prowess* gives it to the war chief, or the military caste. The prestige of *sanctity* gives it to the priestly caste. The prestige of *inspiration* gives it to the prophet. The prestige of *place* gives it to the official class. The prestige of *money* gives it to the capitalists. The prestige of *ideas* gives it to the *élite*. The prestige of *learning* gives it to the mandarins. The absence of prestige and the faith of each man in himself give weight to the individual and reduce social control to a minimum.

In some cases there exists an appropriate name for the régime. When the priest guides, we call it *clericalism*. When the fighting caste is deferred to, we call it *militarism*. When the initiative lies with the minions of the state, we call it *officialism*. The leadership of the moneyed men is *capitalism*. That of the men of ideas is *liberalism*. The reliance of men upon their own wisdom and strength is *individualism*.

Social control has about it a tinge that betrays the source from which it springs. When the reverend seniors monopolize power, much will be made of filial respect and obedience, infanticide will be a small offence, while parricide will be punished with horrible torments. Let the priests get the upper hand and chastity, celibacy, humility, unquestioning belief, and scrupulous observance will be the leading virtues. The ascendancy of the military caste shifts the accent to courage, obedience, loyalty, pugnacity, sensitiveness to personal honor, and the unrelenting pursuit of revenge. When the moneyed man holds the baton in the social orchestra, the keynotes will be industry, thrift, sobriety, probity, and civility. The mandarins and *literati* have no moral program of their own, but they are sure to exalt reverence for order, precedent, and rank. The *élite*, whatever ideal they champion, will be sure to commend the ordering of one's life according to ideas and principles, rather than according to precedent and tradition. For only by fostering the radical spirit can they hope to lead men into un-

trodden paths. We may, then, lay it down as a law that *the character of social requirement changes with every shifting of social power.*

G. The Form of the Business Unit

Our economic order has as basic assumptions private property, freedom of contract, individual initiative, and competition—all these assumptions being more or less accurately defined by society and all being subject to alteration by society. In terms of such basic assumptions, individuals have organized social resources for production. As time has gone on the individuals who have assumed the responsibility for handling social energy (have engaged in the process of organizing social energy for productive purposes and for their own pecuniary gain) have come to operate through certain widely accepted patterns of contractual relationships, have come to use certain institutions. It will facilitate discussion to call these patterns "forms of the business unit."

If we were to survey the many generations through which the forms of the business unit have been developing, we should see well-nigh continuous changes being made. In some cases these changes have been made in order to lighten the risks of the business man—of the individuals who, under our society, are responsible for the guidance of social energy in production. In other cases these changes have been made in order to facilitate gathering together in one business large masses of social energy—large capital. In other cases the motive for the change lay in the desire to secure a more effective method of organizing for management.

There is little use in trying to memorize the characteristics of the various forms of the business unit. Indeed, their characteristics cannot be sharply defined. There is no human being who can set forth precisely and at all points wherein an individual proprietorship differs from a partnership. A corresponding statement may be made of the partnership, the joint stock company, the corporation, and other forms. These forms shade off into one another. They are "containers" and elastic containers, at that. They are shaped and molded to meet business needs; business needs are not squeezed into cut and dried forms of the business unit.

Now this does not mean that it is a mistake to speak of business

units as being of various types or forms of organization. It does mean that we must be careful to remember that they are *flexible* types.

We shall proceed in our study of these types as follows: first, we set up some tests of the efficiency of the different forms of the business unit. Then we canvass *the more usual features* of the following quite incomplete list of forms of the business unit: the individual proprietorship, the agency, the ordinary partnership, the limited partnership, the partnership association, the corporation, the business trust, co-operative industry. Other forms of the business unit will be discussed in a later section, where we shall be particularly concerned with the devices used in modern society to concentrate control of social energy used for production.

The individual proprietorship will probably give us little trouble. All of us already have a considerable mass of general information concerning it. As for the other forms, in which there is association of two or more persons, we may the more readily thread our way through the maze of details if we bear in mind that the law, in its effort to give certainty to business relations, seeks to clarify two sets of relationships: (*a*) the relationships of the associates among themselves *(inter se)* and (*b*) their relationships to others (third parties). We shall find, as we go along, that part of this is cared for in the common law (this is markedly true of the agency and the partnership) and that another part has called for statute law as a means of making relationships certain.

Under the common law, an agent who acts within the scope of his authority binds his principal as truly as if the principal were himself acting. This means, of course, that unless the principal (or his agent) limits his liability when forming a contract, the liability is unlimited. Just here we have an explanation of some of the outstanding features of the partnership, for in the ordinary partnership all partners are principals and all are agents—there is "mutual agency" and unlimited liability for every partner.

Notice that this gives third persons dealing with a partnership a clear understanding concerning what to expect. Upon the one hand, unless these third persons are specifically warned to the contrary by the terms of the contract, they may hold all partners unlimitedly liable. Upon the other hand, the partners may contract among them-

selves in any lawful way concerning management and indeed concerning who will, *so far as they are concerned,* assume the position of first risk. But such agreements *inter se* will not operate to limit the claim of third persons unless the third persons are aware of the situation and consent thereto.

As time has gone on, certain rules of the game have been evolved by society with respect to what will constitute making third persons "legally aware" of certain matters, as for example limitation of liability on the part of some or all of the partners. Mainly, these rules have taken the form of statute law which sets forth that, under such and such conditions, any third person who deals with a given kind of business association does so with the understanding that there is limitation of liability. These conditions will be such as seem to the legislature wise. They may provide that the word "limited" shall be used after the firm name; they may insist that a record shall be set up in some county courthouse or in some state office; they may demand publication in newspapers concerning the organization of such a company; they may do any reasonable thing by way of giving warning to third persons, and what is actually done varies from state to state. There is no use trying to memorize details. What the law seeks to accomplish is that third persons shall have "due notice" and the legislature is, speaking broadly, the judge (within reasonable limits) of what constitutes due notice.

What has just been said is as true of the corporation as it is of the various forms of the "limited" partnership. In the corporation, however, a new element comes to the front. As we know, the law makes an artificial person of the corporation and those associated in such a venture have their relationships *inter se* fixed, not by contracts among themselves, but by their contracts with this artificial person. Again, as we know, these contracts are ordinarily worked out through those devices we call stocks and bonds. This artificial person then deals with "third parties" and it is *unlimitedly liable* to these third parties unless its liability is limited in its contracts with these third parties. It is the *liability of the owners* which is limited and the extent to which it is limited depends upon the terms of their contracts.

Perhaps it is worth while to summarize what has been said thus far in a series of propositions.[58a]

1. The form of social control of prime interest to us in connection with our study of the form of the business unit is law, which is of two main kinds, (*a*) common law and (*b*) statute law.

2. Since the individual proprietorship (in its pure form) means that there is but one person responsible, the law involved in his case has to do with his relations to others. It is largely common law.

3. In those forms of the business unit where there is an association of two or more persons, the law is concerned with two matters: (*a*) the relationships or the rights, duties, and obligations of the associates *among themselves (inter se)*; (*b*) their relationships *to others* (third persons).

4. In theory at least, the law seeks to promote the welfare of society by giving "certainty" to these relationships so that all concerned may proceed about their affairs with confidence.

5. These relationships are in very large part contractual (the expression "this is a society of contractual relationships" ought to be assuming a large meaning), and they may accordingly have almost infinite variety. Just what these relationships shall be (1) depends upon the terms of the contract and (2) that depends upon the law of the land.

6. The forms of the business unit which have actually come into common use have arisen as means to the accomplishment of certain business ends. They can be better understood when studied with this in mind. It is of little value to try to memorize a list of these forms and the attributes applicable to each. Instead, try to realize that the forms are varying methods of fixing relationships (1) *inter se* and (2) with third persons.

7. Many puzzling details cease to puzzle if you keep in mind that one outstanding problem is that of letting third persons know the rights, duties, and obligations of those with whom they are dealing. Of course it *could* be done by having every such "deal" covered by a contract setting forth the whole story. This would be cumbersome,

[58a] A detailed set of questions in connection with these propositions may be found in *Outlines of the Economic Order*, pp. 86–90. (University of Chicago Press.)

however, and instead we commonly resort to some scheme of "public notice" of the situation, and after that notice has been given, third persons are assumed to know the situation, and to govern themselves accordingly. This statement applies particularly to "limited" partnerships and to corporations.

1. THE TESTS OF EFFICIENCY OF FORMS OF THE BUSINESS UNIT[59]

What have been the tests of efficiency which have determined the development and survival of the different forms of business organization? What are the tests for judging their relative efficiency to-day? The general test of economy is too indefinite for easy application. We may subdivide it into some five or six more particular and specific tests, as follows:

1. *Facility of formation.*—At the outset, the question of the ease of setting up in business differentiates one form of business organization from another. Aside from the question of raising capital, which is to be made a distinct test, there are questions of suitable associates, of expense, legal restrictions, etc. The problem of promotion is a big one nowadays, and one of the promoter's usual duties is to devise a suitable organization for his enterprise.

2. *Amount of capital.*—With the growing importance of capital in production, it has become increasingly essential that the form of business organization shall be one that facilitates the acquisition of large amounts of that factor. To this end it must afford a maximum degree of security, and appeal widely to the investing class. To be sure, where small capital is required, other tests may decide, but the preceding statement holds for industry as a whole.

3. *Liability.*—Closely connected with the subject of capital is the liability point. Risk is one of the chief elements in all business, and the form which will reduce risk to the minimum will most appeal to business men, when other things are equal. A certain amount of liability is essential in order to secure a proper motivation and direction of industry, and to insure those who deal with the business organization of fair treatment; but any greater liability than will attain these

[59] Adapted by permission from L. H. Haney, *Business Organization and Combination*, pp. 35, 36. By permission of the Macmillan Company, publishers (1904).

ends is undesirable from all points of view. Liability may be of two kinds: financial and legal. The former concerns economic responsibility in case of insolvency; the latter concerns juristic responsibility for criminal and civil offenses.

4. *Direction.*—Assuming that the capital has been raised, what efficiency will the form of organization, within which it is combined with the other factors, afford? The test of effective direction is in reality to be reduced to several subordinate tests. First, there is motivation, which concerns the intensity and directness of the stimulus to business activity. Then there are economy of operation, continuity of policy, flexibility of organization, to mention the more important points. By flexibility is meant adaptability to changing conditions, such adaptability being needed now for capital, now for membership, and again for centralization of management.

5. *Endurance and stability.*—The degree of permanence of the various forms of organization varies considerably, and this is a matter of no small importance. It is important to the individual to be able to lay business plans for the future and to make investments running for considerable periods of time. To the society it is important that some agency should exist for continuing in uninterrupted life the undertakings upon which its members depend for the satisfaction of their economic wants. In order to satisfy these needs the organization must both be able when undisturbed to last through a long period of time, and also to resist temporary disturbing influence, that is, be stable.

Finally, (6) a *legality* test may be mentioned. In every civilized society there is a changing body of legal rules which must be observed if the form of organization is to be most effective. A form of organization like the trust, for example, is obviously inexpedient because of legal conditions. Thus the law reacts upon economy. Indeed, from the association standpoint the various forms of business organization are, as such, children whose father is economic expediency and whose mother is the law.

That the foregoing tests may be applied both from the point of view of the individual—the "private point of view"—and from the point of view of society—the "public point of view"—must ever be borne in mind.

2. THE INDIVIDUAL PROPRIETORSHIP, THE PARTNERSHIP, AND THE CORPORATION[60]

In an individualistic competitive economic society every competent individual of mature age is a potential entrepreneur. Each person is in varying degree awake to the voicings of demand for consumable goods. There is no ear on which these fall wholly without answering resonance.

The potential enterpriser, having decided to what end he will undertake to direct social energy, looks about for ways and means. There are chiefly three ways in which the enterpriser may launch his business. They are these:

1. He may become an individual organizer or entrepreneur.
2. He may join in a relation with other persons, called a partnership.
3. He may decide that his business should be conducted by a corporation.

There are some advantages and disadvantages in each of these forms of business organization from the standpoint both of the entrepreneur and of society as a whole. We shall consider the three types in order.

1. *The individual entrepreneur organization.*—A first advantage of the individual entrepreneur organization is the ease with which it may be formed and terminated. To start in business it is not necessary to go through any formalities. One may begin with any kind of business. He may start any time he thinks he can do so profitably, and may stop without consulting anyone but himself.

A second advantage which the individual finds in going into business alone is that if there are profits he takes them all. If he is capable and energetic he is likely to be successful, and can keep for himself all the results of his ability and industry. His management is likely to be definite and coherent in its policy, and will never suffer from a variety of counsels.

In some ways society also gains by having individual entrepreneur organizations. Men who know that their chances of success or failure depend on themselves will work hard. The chance for gain is a strong incentive. This means, if they are capable, increased produc-

[60] Prepared by L. S. Lyon.

tion of goods, which of course means that there will be more for society to consume. Society also profits from this type of organization because these people are being constantly educated in business management. Lured by the prize of profits, threatened by the rod of failure, they are diligent in learning to direct more and more social energy for society's benefit.

There are, of course, disadvantages in this form of organization. If a man goes into business alone he makes all the profits, but if there is a loss he has no one with whom to share it. Besides this, he has always to rely mainly on his own judgment. Management is limited in breadth of view. The enterpriser has no one who is really interested in his business with whom to consult. Limitations in capital are also apparent. The amount of money which he can put into his business is limited by his personal fortune and his credit. It may be that there will be times when he could make large profits if he had more funds, but he is unable to supply them. At such times he is likely to wish for a partner. The final disadvantage in this form of business, as the entrepreneur views it, grows out of the fact that there is no distinction between his business liabilities and assets and his personal liabilities and assets. He is unable to take the risks of business with part of his money only. If his business fails the receiver will utilize "personal property" as well as "business property" in satisfying creditors.

The Individual Proprietor

has relationships, and especially contractual relationships, with

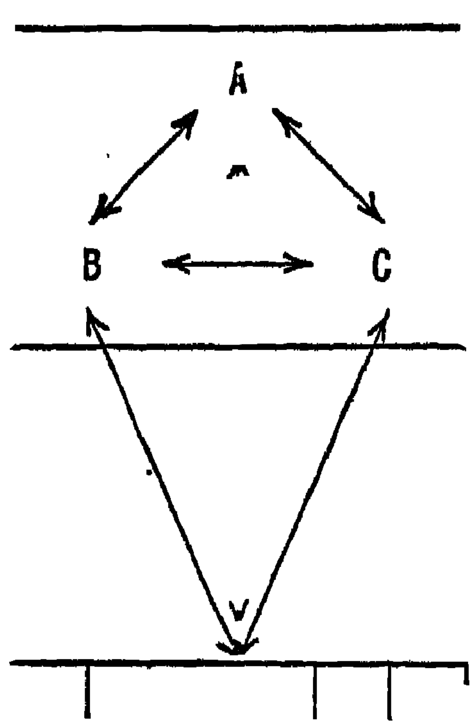
Others

2. *The partnership.*—Suppose that, instead of going into business alone, the enterpriser joins with two or three others, agreeing to divide the profits and losses. Although men may be, and often actually become, partners by implication, partnership is usually based upon a simple oral or written agreement. The legal relationship arising from their agreement to transact business in this way is called a partnership. The partners together are usually spoken of as a firm. The partnership brings with it changes in management and ordinarily of capital. The management generally rests with all the partners and, though by no means necessary, all may invest capital.

From what has just been said of the individual entrepreneur, it is easy to see why the partnership should arise. When business began to

be transacted on so large a scale that one man did not have sufficient capital to conduct the business alone, and when business became so specialized that one man was not likely to know everything about every phase of the business, the partnership became a valuable institution.

From the standpoint of the individuals concerned it is valuable because, though each of them has only a small amount of money, they may, by combining, have enough to carry on an extensive business. One of them may be a specialist and expert in managing a small manufacturing plant. The other may be an able salesman, and, by combining the ability of both, they are able to manufacture goods and sell them to advantage. Neither has the partnership necessarily lessened the driving motives. Reward still depends on success. Profits will still be closely related to endeavor.



PARTNERSHIP RELATIONSHIPS

Notice that the partners are within the rectangle. Compare this diagram with the diagram of a corporation. There the owners are *outside* of the rectangle.

It is easy to see that this institution of partnership is a good type of business organization in each of these cases, from the standpoint of society as well as from the view of the partner. It makes good use of social energy.

As the entrepreneur views the matter, there are some disadvantages and limitations connected with the partnership. The first is that the amount of capital, although fairly large, may be insufficient. Even by joining their money the two or three or more persons may not have secured enough to carry on the business which they have undertaken. The discussion of other disadvantages will reveal why the number of persons in a given partnership must be somewhat limited.

A second group of difficulties grows out of the new elements in management. One of these is a certain degree of inflexibility. Policies cannot be so easily modified and fitted to new conditions as they can be where one individual is in command. Lack of harmony in management may easily grow out of the responsible relations of partnership where viewpoint and opinion vary.

Another objection to partnership, which comes from the widened management, is a certain amount of instability. The partnership may undergo dissolution from a number of causes. Some of these it is beyond the power of the firm to prevent. The bankruptcy of a partner or his death will ordinarily cause a dissolution of the firm. Unless there is an agreement to the contrary, one party may withdraw or sell his share and thus bring about a dissolution. Even though an agreement may exist, one partner may withdraw if he cares to undergo an action for damages. Any of these things occurring at certain times might be disastrous to the welfare of the firm.

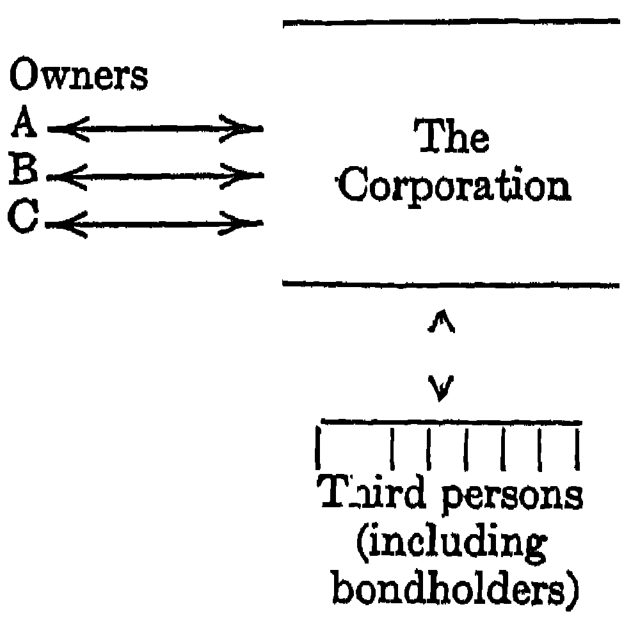
A final disadvantage which the entrepreneur sees as arising from the broadened management is a new element of risk and responsibility. This grows from the legal fact that each partner is, in all ordinary affairs, an agent for the firm. Each partner may, in matters that relate to the general business of the firm, make contracts binding on the firm. This becomes a serious consideration in view of the liability of partners. The obligations of a partnership are the joint obligations of its members—that is, the action to enforce it is brought against all jointly. But, although the creditor brings an action for his debt against all the members of the partnership jointly, he may satisfy his judgment out of the individual property of one partner, and is not bound to levy upon the joint partnership property.

It is obvious that this obligation for debts makes partnership a form of business organization into which a man will go only after a careful consideration of the type of men with whom he is joining. From this great liability for debts, however, arises one additional advantage to the partnership form of organization. This is the ease with which a partnership can borrow money. People are willing to lend where the liability reaches so far.

3. *The corporation.*—It should be needless, in discussing the corporation, to clear the mind of such dusty impressions as the notion that a corporation is necessarily a large and usually a vicious organization. Many corporations are capitalized for only a thousand dollars, and the American Bible Society and several boards of foreign missions find it convenient to transact their business through the corporate form.

The corporation, like the individual organization and partnership,

is simply a type of business organization which has grown up because society needed it as a device through which social energy could be effectively directed in satisfying wants. A corporation is sometimes defined as an artificial entity, created by statute law under a special name, with the liberty of perpetual succession, acting in many respects as an individual. The point to be held clearly in mind is this, that the corporation is a separate person. Nine persons in a room, to use a common illustration, form a corporation. There are then ten individuals in the room. A corporation is a distinct legal entity, separate from the people who compose it.



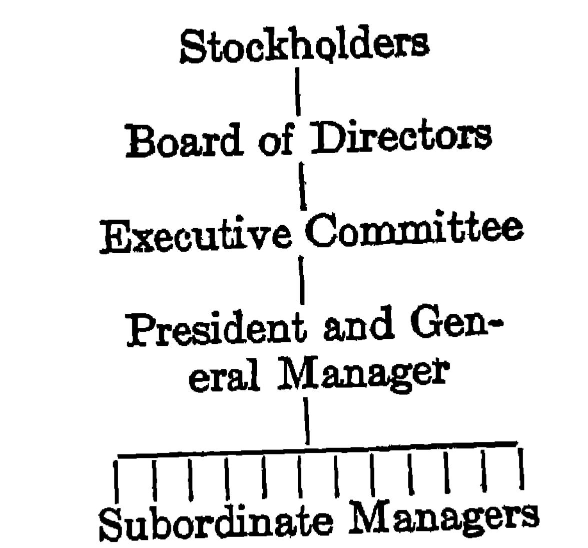
Corporate Relationships

Some of the advantages of the corporation are quite obvious. Most notable of these perhaps is the readiness with which it adapts itself to the raising of large amounts of money. Shares of ownership in corporations may bear a face or par value set at prices ranging from hundreds of dollars to a few cents. There is ordinarily no limit to the amount for which a corporation may capitalize, and no limit in either direction to the amount an individual may subscribe to the capitalization provided he is willing to subscribe for at least one share. It thus becomes possible to interest many persons and to accumulate gigantic sums of money.

If the individual who is contemplating the formation of a new business has in mind an undertaking which will require a great deal of capital the corporation plainly lends itself to his needs. In the matter of capital possibilities the corporation is no less advantageous to society. It is not enough to say that such vast undertakings as railroads, steamship lines, and large manufacturing plants would have been difficult without the corporate type of business organization. It is not too much to say that the whole new technology, which was the wonder of the nineteenth century, and which was made possible by the scientific discoveries of the earlier centuries, would not have been so quickly and so fully available to man had it not been for the corporate type of business organization. In several other ways society

finds advantage in the capitalizing methods of the corporate form. The small savings of many people are brought into productive use. These might lie idle were it not for the possibility of investments of small amounts.

As the individual views the corporation it has a further advantage in the matter of liability, an advantage which also reflects favorably upon the amassing of capital. Ordinarily there is no liability or chance for loss beyond the amount invested in the stock of the corporation. The debts of the corporation, being those of an artificial but distinct personality, are quite separate from the property of the individual shareholders. Now it should be noticed that there is nothing here in the law that is new or that is more favorable to corporations than to private persons. The corporation is absolutely liable to the extent of all of its assets for all of its debts. But the corporation is an individual. The people who own shares are no more the corporation than they are each other. Thus their property cannot be applied to the obligations of the corporation. National banks, where double liability attaches, are the principal exception to this rule. The advantage of this situation to society as a whole is somewhat more doubtful. Complaints that responsibility cannot be located, and that reckless action has often been taken by corporations because of this limited liability, are not uncommon. So far as the limited responsibility leads to unwise direction of the social energy under control these complaints are a justifiable objection to the corporate form. It must be recognized, however, that those who deal with corporations are generally fully aware of this limited liability and guide themselves and grant credit accordingly. It must also be recognized that this limited liability has been of tremendous benefit in drawing the money of investors into profitable enterprise.



Possible Organization of a Corporate Business

A final consideration in viewing the corporation as a type of business organization is its scheme of management. Control is usually vested in the stockholders in proportion to the number of shares which

they own. Frequently only stockholders of a certain type, as the holders of preferred stock or of common stock, may have the right to vote. This control is almost invariably turned over to a board of directors who may delegate it in turn to an executive committee, who may re-delegate it to a general manager. Where the interests of the corporation are large it is usually possible and profitable to secure the most able managers. If managers are not good it is easy to remove them. It is interesting in this connection to compare the difficulty and friction of removing or changing the management of a partnership.

3. AGENCY AS AN ORGANIZATION DEVICE[61]

One of the most significant, pervasive, and, perhaps, obvious facts in the study of modern society is the well-nigh universal utilization of agency as an organization device in the conduct of business. So universal is this fact that it can scarcely be more than an interesting speculation to inquire how far business activities are carried on by those acting in representative capacities.

Agency is a basic principle underlying all forms of business association. The nature and characteristics of partnership, joint-stock companies, and corporations can be understood only in terms of this fundamental hypothesis that one person can act for and in the place of another. Each of the organization devices, of course, is marked by features more or less peculiar to itself; but in the final analysis each is based upon the relation of principal and agent.

The objects for which an agency may be formed are almost as unlimited as human activities. There are in fact relatively few things which cannot be done as well through an agent as in person. Unlawful undertakings, commission of crimes, the doings of acts contrary to public policy, cannot be legally delegated to an agent; certain acts, very personal to one, such as voting, taking an oath, or entering into the marriage relation, cannot be performed through an agency; and as a general rule delegated authority cannot be re-delegated.

The formation of an agency is on the whole a fairly simple and non-technical transaction. The relation arises out of a voluntary agreement of the parties and is not ordinarily imposed upon them without their consent. It may be expressly made or it may be left to

[61] By W. H. Spencer.

implication. It may originate in a contract or it may result from a gratuitous promise of the agent. The constitution of another as an agent need not be evidenced by any writing in the absence of a statute requiring written evidence. Where an agency does arise out of a contract, the usual principles of the law of contracts, with reference to the capacity of parties, mutual assent and consideration apply. The main consideration in the creation of an agency at least from the principal's point of view is a careful delineation of the powers of the agent.

The agency relation has for its main purpose the carrying of the principal to a third person through the medium of the agent. Its operation is, therefore, tripartite; its operation always affects three different parties and produces, therefore, three distinct groups of consequences: (1) consequences as between the principal and the agent; (2) consequences as between the principal and the third person; and (3) consequences as between the agent and the third person.

1. As between the principal and the agent, on the one hand, there is a series of duties which the principal owes to his agent by reason of the relation.

On the other hand, there is a series of duties which the agent owes to the principal. The agent is under a duty to obey all instructions which his principal may impart to him. He owes a duty to the principal to exercise a reasonable degree of care and prudence in the performance of his duties. It is said, however, that an agent who undertakes to serve a principal gratuitously is under a duty to show only a slight degree of care in the exercise of his authority. The agent is under a duty to manifest a high degree of good faith in all of his dealings with his principal and on his behalf.

2. What now are the consequences of the operation of the agency relation as between the principal and a third person? In general it may be said that the principal is bound by every act and contract of the agent within the scope of the latter's authority. Stated negatively, the principal is not bound by acts and contracts which are outside the scope of the agent's authority. It is impossible in this connection to indicate in detail what is included in the phrase, "the scope of the agent's authority." Speaking broadly, however, the scope of the agent's authority, in the first place, includes all of those powers which the principal expressly confers upon the agent and subjectively in-

tends that he shall exercise; it includes, in the second place, any power which the principal leads the third person reasonably to believe that he has conferred upon the agent.

3. Now as to the consequences of the operation of the relation between the agent and the third person. The general rule is that the principal and the principal alone is bound by contracts which the agent makes within the scope of his authority. However, there is one very important exception to this general rule: If the agent, as is frequently the case, fails to disclose his principal, the third person may at his election hold the agent or the principal, when he is disclosed, on the contract.

If the agent exceeds his authority in making a contract, the principal is of course not bound by it; nor is the agent bound by it because the contract does not purport to be with him. What protection has a third person under such circumstances? If the agent knowingly and intentionally exceeds his authority, the third person may hold him in damages for fraud; if the agent innocently exceeds his authority, the third person in some cases may hold him liable in damages for a breach of an implied warranty of authority. Otherwise, the third person deals with an agent at his peril and must assume the risk of the agent's exceeding his authority.

The relation of principal and agent may be terminated in one of several ways. The relation is the result of an agreement of the parties to it and may always be changed or terminated by a subsequent agreement of the parties regardless of the content of their original understanding. An agency created for a definite time terminates upon the expiration of that time; an agency for a specific object comes to an end upon the accomplishment of the object. A gratuitous agency may be terminated by either the principal or the agent at will. An agency, even when it arises out of a contract, may be terminated by the act of either party: The principal may revoke the agent's authority or the agent may renounce his agency. In either event, however, the act terminating the relation is a wrongful act, a breach of contract, for which the injured party is entitled to recover damages. The relation is generally cut short by the death or the insanity of either the principal or the agent. The relation is similarly affected by the bankruptcy of either principal or agent as to matters involved in the bankruptcy proceedings.

4. DEFINITION AND GENERAL NATURE OF JOINT STOCK COMPANIES[62]

[The student should notice that in many jurisdictions these companies, also, are regulated by statute, although "the association is based upon the common law right of the members to contract with one another."]

A joint stock company may be defined as an unincorporated and voluntary association formed for the purpose of profit, having a common name, possessing a common capital contributed by the persons composing it, which capital is divided or agreed to be divided into shares of which each member possesses one or more, and which represent the interests of the members, and are transferable by the owner without the express consent of the other members or the creditors of the association. "Joint stock companies may be cited as quasi corporations of a private character. They are associations having some of the features of an ordinary common-law copartnership, and some of the features of a private corporation." Those definitions in which a joint stock company is denominated a partnership, contemplate the individual liability to third persons imposed by the law upon the members of the association, rather than the nature of the company in respect to its formation, the management of its affairs, its duration and dissolution which are among its distinctive characteristics.

From the preceding definitions we may deduce the following observations concerning the general nature of joint stock companies.

a) Such a company owes its existence to the contracts of its members as set forth in the articles of association by virtue of which it has a valid legal entity under the common law, with a right to extend its existence as the parties forming it may see fit to provide in such agreement. But they are largely regulated by statute in many jurisdictions.

b) As between themselves, each member of an unincorporated association, after all the assets of the company are exhausted, is bound to pay his proportion of the debts of the concern; but as to the creditors each member is liable for all such debts, no matter what the private arrangements among the members may be.

c) The association has a common name, which is usually descriptive of the business for which it is formed and does not consist of the

[62] Adapted from Scott Rowley, *The Modern Law of Partnership*, II, 1417–20. By permission of the Bobbs-Merrill Company, Copyrighted, 1916.

names of persons. In this name it may enter into contracts in the manner prescribed by the articles of association, and may generally sue and be sued under that name.

d) The capital of the company is divided into shares, and the number of shares held by each member determines his interest and the extent of his control of the management, and as between the members themselves fixes his proportion of liability for debts of the association. Ordinarily these shares represent a certain amount of money, or the value of property transferred to the company by the shareholders.

e) The shares are transferable at the will of the owner, or at his death become assets of the estate in the hands of his personal representative.

5. LIMITED PARTNERSHIPS AND PARTNERSHIP ASSOCIATIONS[63]

[The reader should observe that statute law is called upon to make these associations possible. Third persons must have their "due notice" of limitation of liability.]

A limited partnership is a partnership in which the liability of some of its members to bear any losses the partnership may sustain is limited to a defined amount, while the liability of its other members is not so limited. It must at all times consist of at least one general partner to be answerable to the public under the law for all the obligations of the partnership and at least one partner whose liability is limited to the sum contributed by him to the firm at its organization or to some amount provided by the statute. It is therefore properly based only on the existence of a general partnership and its general partners have the same rights and incur the same liability that members of a general partnership incur, but their duties are even more burdensome since they are deprived of any assistance from the limited members. The liability of a limited partner is generally limited by the statute to the amount he has contributed to the partnership at its formation. However, in some states his liability is fixed by statute otherwise.

Such partnerships in some respects partake of the nature of corporations; they can only exist where authorized by statute and the lia-

[63] Adapted from Scott Rowley, *The Modern Law of Partnership*, II, 1370–76. By permission of The Bobbs-Merrill Company, Copyrighted, 1916.

bility of some of their members is limited like the liability of stockholders in some kinds of corporations; their business is to be conducted by the general partners, while the business of a corporation is to be conducted by its board of directors. But this distinction must always be kept in mind: the directors of a corporation are selected by the stockholders and may be changed by such stockholders, while the general partners in a limited partnership are not selected by the limited members nor can they be changed by them. A corporation is an artificial person and constitutes a legal entity, and its stockholders may transfer their stock, while a limited partnership, aside from its members, does not become a legal entity and generally its members may not change except upon dissolution and reorganization under the statute.

[There is no need of detailed discussion of the so-called *partnership association.* Its fundamental difference from the "limited partnership" is that in the "association" all the partners have limited liability. It is apparent that this is possible only by giving "public notice" to third parties and that accordingly a statute will be passed setting forth the conditions under which such "associations" may operate.]

6. SIMPLE BUSINESS TRUSTS[64]

When the word "trust" is mentioned, most men at once think of some illegal combination. The term is in bad odor. Yet if one were to inquire of a lawyer concerning trusts one would probably be told that they are very desirable social institutions, and that they are perfectly legal. Moreover, in the conservative state of Massachusetts, one could find scores of harmless business organizations which are carried on under the trust form.

The simple business trust is a form of business organization under which the legal title to property is vested in an individual trustee or individual trustees. (Corporations may act as trustees, as is the case with trust companies. In such cases, the trust is the function; the organization is a corporation.) The property is managed by them in the interest of the former title holders who become "beneficiaries" (*cestuis que trustent*). The trustees thus become, not agents—as are partners

[64] Adapted from L. H. Haney, *Business Organization and Combination,* pp. 117–27. By permission of The Macmillan Company, publishers (1914).

—but principals; and they can make contracts, and can sue and be sued in their own names. The beneficiaries, in turn, are neither partners nor agents. They cannot convey the property to others; nor can they usually maintain any action at law for its protection. They only have the right of action against the trustees. With such a relation existing between trustees and beneficiaries, it is apparent that without any special provision to the contrary the debts of the business lie against the trustees, not against the beneficiaries.

Under the common law, trustees may and do issue certificates of beneficial interest, the capital embraced in the trust being divided into shares. These certificates are much like the stock certificates of a business corporation.

7. THE COÖPERATIVE[65]

The coöperative organization may take the form of a *corporation with capital stock, a corporation without capital stock,* or of a *simple membership association.* The essential idea of all coöperatives however organized is *management in the interest of those who do business with or through the association rather than in the interest of those who furnish the money to start the enterprise.* Thus in a coöperative association for selling live stock, the proceeds from the sale of the live stock over and above the actual expenses connected therewith are all prorated back to the individual farmers furnishing the live stock. There are no "profits" to distribute. The service is rendered at cost, and each member pays exactly for the service which he receives. If the organization needs capital, it may borrow it on the joint security of all the members, or may sell shares of stock to the members. If the latter plan is followed, the organization becomes a capital-stock coöperative corporation. The other essential idea of coöperative organization is democratic control by the members. In the membership association and the non-stock corporation, this is secured without any special arrangement—each member can have but one vote; in the capital-stock coöperative, it is secured by allowing each member one vote regardless of the number of shares he owns. To make democratic control still more certain, the number of shares that one member may own

[65] J. D. Black, *Introduction to Production Economics*, pp. 505–9. (Henry Holt & Co., 1926.)

is usually limited in the by-laws. It is ordinarily said that the three cardinal requisites of a true coöperative corporation are the *limiting of voting to one vote per member, limiting the dividends on stock,* and *limiting the number of shares that one person may own.*

The coöperative type of organization has a number of advantages which make it especially adapted to certain types of business situations, and which account for the remarkable swing toward coöperation in certain fields.

1. The members of a coöperative marketing organization feel more certain that they are getting all that their produce is worth than they would if they sold to a private buyer.

2. Because of the foregoing, farmers will deliver more produce to a coöperative enterprise than to a private one. They are willing to give a coöperative enterprise a monopoly of their business, but not a private buyer. Hence coöperative organizations tend to grow larger than their proprietary competitors, and to have lower handling costs in consequence.

3. Members of coöperatives are more easily interested in improving the quality of their produce than are the customers of a private marketing business. They feel more certain that the extra prices received for better quality will be reflected back to them. More important than this, a large coöperative organization, having under contract the product of several thousand members, can safely undertake to educate its members in improving quality.

4. The larger volume of product under one management makes possible many of the economies of large-scale production which will be pointed out in a later chapter.

5. The members of a coöperative are joint managers of their organization in a much more real sense than are the stockholders in an ordinary corporation.

It will be noticed that all of the advantages grow out of the essential nature of the coöperative type of organization—democratic control by and in the interest of the members.

But there are a number of important weaknesses of coöperatives traceable to the same source: the most important one is that too democratic control sometimes handicaps the central management in carrying out good business programs. The members are too poorly in-

formed in business affairs to make wise decisions; but they make them anyway in spite of the counsel of their officers and those who are most closely in touch with the business situations.

Although the coöperative type of organization is much more prevalent in the marketing of farm products than anywhere else, this need not always be the case. There is every indication that business units of many other types will combine increasingly into coöperative organizations.

8. RELATIVE IMPORTANCE OF THE MAIN FORMS OF THE BUSINESS UNIT[66]

One of the striking features of the evolution of modern industrial society has been the development of the corporation. The statistics in this field are of such very recent origin that, except for the last few years, no quantitative study of the growth of this form of organization can be presented which can lay any claim to accuracy. From the United States Census we find that, during the decade 1899–1909, the fraction of the mineral output produced by corporation-owned mines increased from about 85.0 to 92.2 per cent, while, in the manufacturing field, during the same period, corporations increased their share of the value added by manufacturers from approximately 63.3 to 77.2 per cent. We know that transportation by water, rail, and wire has been mainly carried on by corporations for several decades. In commercial enterprises, the general impression is that the stock company is gradually playing a more important part than formerly. Only in the field of agriculture does the individual entrepreneur—the man who controls and directs his own business—still remain dominant and almost without corporate rivals. A rough estimate indicates that, of the total products of American industry in 1899, some 39 per cent or approximately seven billion dollars' worth, and, in 1909, about 44 per cent, or thirteen billion dollars' worth, were turned out by corporation-owned plants.

[66] Adapted by permission from W. I. King, *The Wealth and Income of the People of the United States*, pp. 208–11. (The Macmillan Company, 1915.)

9. THE CHANGING FORM OF THE BUSINESS UNIT IN MANUFACTURE[67]

Coincident with the development of the factory system and the enlarged scale of production has come a change in the legal organization of industrial enterprises.

ESTABLISHMENTS, WAGE EARNERS, AND VALUE OF PRODUCTS, BY CHARACTER OF OWNERSHIP: 1904 TO 1919

CHARACTER OF OWNERSHIP	ESTABLISHMENTS		WAGE EARNERS		VALUE OF PRODUCTS	
	Number	Per Cent Distribution	Number	Per Cent Distribution	Amount in Millions	Per Cent Distribution
All classes:						
1904	216,180	100.0	5,468,383	100.0	$14,794	100.0
1909	268,491	100.0	6,615,046	100.0	20,672	100.0
1914	275,791	100.0	7,036,247	100.0	24,246	100.0
1919	290,105	100.0	9,096,372	100.0	62,418	100.0
Individuals:						
1904	113,946	52.7	755,923	13.8	1,703	11.5
1909	140,605	52.4	804,883	12.2	2,042	9.9
1914	142,436	51.6	707,568	10.1	1,925	7.9
1919	138,112	47.6	623,469	6.9	3,536	5.7
Corporations:						
1904	51,097	23.6	3,862,698	70.6	10,904	73.7
1909	69,501	25.9	5,002,393	75.6	16,341	79.0
1914	78,152	28.3	5,649,891	80.3	20,183	83.2
1919	91,517	31.5	7,875,132	86.6	54,745	87.7
All other:						
1904	51,137	23.7	849,762	15.5	2,187	14.8
1909	58,385	21.7	807,770	12.2	2,289	11.1
1914	55,203	20.0	678,788	9.6	2,138	8.8
1919	60,476	20.8	597,771	6.6	4,137	6.6

Ownership prior to 1914 was reported under four headings, "Individuals," "Corporations," "Firms," and "All others." For the purpose of this study the last two classes are combined. The group "all others," therefore, is made up chiefly of establishments operated by firms, but includes cooperative associations and miscellaneous forms of ownership that could not be classed as "individuals" or as "corporations." As can be seen from the table, and even more clearly from the chart, the greatest number of establishments are operated by individuals, although corporations have increased from 23.6 per cent of

[67] Willard L. Thorp, *The Integration of Industrial Operation*, Census Monograph I. (Washington, D.C.: U.S. Department of Commerce, 1924.)

the total number in 1904 to 31.5 per cent in 1919. This growth in the proportion of corporations was quite regular throughout the period, and thus far has given no signs of diminution.

The most significant figures, however, are those which show the extent of the industrial activity of the corporations. Although including only 31.5 per cent of the establishments, they employed 86.6 per cent of the wage earners and manufactured 87.7 per cent of the total value of the products. The contrast in activity is brought out very

CORPORATE OWNERSHIP IN 12 RECENTLY DEVELOPED INDUSTRIES: 1919

Industry	Establishments: Total Number	Owned by Corporations: Number	Owned by Corporations: Per Cent of Total
All industries	290,105	91,517	31.5
Total for 12 industries	5,792	4,301	74.3
Aeroplanes	31	26	83.9
Automobiles	315	292	92.7
Sugar, beet	85	84	98.8
Cement	123	118	95.9
Electrical machinery, apparatus, and supplies	1,404	1,066	75.9
Ice, manufactured	2,867	1,911	66.7
Rubber goods	437	368	84.2
Oleomargarine and other butter substitutes	42	41	97.6
Phonographs	166	132	79.5
Aluminum manufactures	83	65	78.3
Coal-tar products	183	168	91.8
Pens, fountain and stylographic	56	30	53.6

clearly by the averages per establishment, in which the corporations far exceed the other forms. Whereas establishments operated by corporations employ an average of 86.1 wage earners per establishment, those operated by individuals average only 4.5 wage earners per establishment.

The corporate form of ownership is more prevalent among the newly formed enterprises. In the table shown above the character of ownership figures are given for 12 industries, which have been selected because they represent industrial activity whose development has been relatively recent. It is significant to note the character of ownership in these industries. The smallest proportion of corporate

ownership is more than two-thirds larger than the average for all industry, and in 10 of the 12 more than three-fourths of all establishments are corporation owned. These facts afford fairly positive evidence that enterprises which are now entering for the first time into industrial activity are prone to adopt the corporate form of organization.

In industries in which large capital investments are necessary for the proper operation of enterprises the establishments are, as a rule,

CORPORATE OWNERSHIP IN THE 13 INDUSTRIES LEADING IN TERMS OF LARGE-SCALE PRODUCTION: 1919

Industry	Rank: According to Wage Earners[1]	Rank: According to Value of Products[2]	Establishments: Total Number	Operated by Corporations: Number	Operated by Corporations: Per Cent of Total
Sugar refining	1	1	20	17	85.0
Boots and shoes, rubber	2	5	25	24	96.0
Smelting and refining, copper	8	2	34	34	100.0
Iron and steel, steel works and rolling mills	5	10	500	481	96.2
Shipbuilding, steel	3	13	162	148	91.4
Belting and hose, rubber	9	7	15	15	100.0
Smelting and refining, lead	12	3	25	24	96.0
Locomotives	6	11	17	16	94.1
Smelting and refining, zinc	13	6	39	39	100.0
Cars, electric-railroad	7	14	7	6	85.7
Iron and steel, blast furnaces	16	9	195	187	95.9
Ordnance and accessories	10	15	26	25	96.2
Cars, steam-railroad	11	16	99	98	99.0

[1] According to proportion of establishments employing over 250 wage earners.
[2] According to proportion of establishments producing over $1,000,000 products.

operated by corporations, since it is easier under this form of ownership to obtain the required capital. This generalization has as its logical corollary that the larger the establishments in an industry the more apt are they to operate under the corporate form of ownership. Data on this point are given in the table shown above. The 13 industries operating on the largest scale are here listed, ranked according to their concentration in terms of wage earners and of value of products, with the percentages of establishments which are corporate owned. Only two industries fall below the 90 per cent mark.

At the other end of the scale are certain industries into which the corporate form of organization has not entered to such a degree. In

general, these are the smaller and less significant industries. In 1900 there were 19 industries in which less than 70 per cent of the product was made in establishments owned by corporations. By 1914 this number had decreased to 10, and in 1919 to 9. The industries which recorded low percentages made by corporations in 1919 were:

Industry	Per Cent	Industry	Per Cent
Clothing, women's	32.9	Jewelry	55.4
Millinery and lace goods	46.9	Clothing, men's, including shirts	55.5
Turpentine and rosin	47.0	Butter, cheese, and condensed milk	65.8
Bread and other bakery products	51.8	Leather goods	67.1
Marble and stone work	52.6		

Of the major industries these nine are therefore those in which the development of corporate ownership has shown the least progress. They are all industries in which the average size of establishment is small. They average 12.3 wage earners per establishment, as compared with the general average of 31.4 for all industry. If the two clothing industries, in which the lack of corporate ownership is to a considerable degree the result of the sporadic nature of many shops and of the unusual extent of family holdings, be excluded, the average number of wage earners drops to 8.2 per establishment. In other words, just as it was shown that corporate ownership appeared particularly in industries in which operations are on a large scale so it is evident that in the industries which operate on a small scale the extent of corporate ownership is less.

Although in any particular industry the corporation-owned establishments may be few, they usually carry on the major part of the activity of the industry. To illustrate this situation, the table on page 475 has been constructed. Although in the 22 industries in question the proportion of establishments operated by corporations ranged from 6.1 to 25.7 per cent, the proportion of wage earners ranged from 30.4 to 76.6 per cent and of value of products from 20.7 to 83.5 per cent.

Notwithstanding the tendency of partnerships to change to the corporate form of organization, the partnership or firm is still important, particularly in certain industries peculiar to cities, such as those manufacturing clothing, and the allied industries such as those producing artificial flowers, feathers and plumes, buttons, fur goods,

men's furnishing goods, fur-felt hats, and millinery and lace goods. Of the concerns which reported themselves as being on a cooperative basis practically all belonged either to the butter, cheese, and condensed milk industries, or the printing and publishing industry. In

ACTIVITY OF CORPORATIONS IN 22 INDUSTRIES HAVING FEWEST ESTABLISHMENTS OWNED BY CORPORATIONS: 1919

Industry	Establishments			Wage Earners (Average Number)			Value of Products (Thousands of Dollars)		
	Total	Operated by Corporations		Total	In Establishments Owned by Corporations		Total	In Establishments Owned by Corporations	
		Number	Per Cent of Total		Number	Per Cent of Total		Amounts	Per Cent of Total
Bread and other bakery products	25,095	1,748	7.0	141,592	76,008	53.7	1,151,896	596,560	51.8
Brooms	1,034	154	14.9	6,313	3,254	51.5	30,205	14,585	48.3
Carpets, rag	339	32	9.4	2,016	612	30.4	5,597	1,749	31.2
Carriages and wagons, including repairs	2,286	249	10.9	18,173	12,136	66.8	91,463	68,712	75.1
Cheese	3,530	505	14.3	3,997	1,288	32.2	143,456	29,676	20.7
Clothing, women's	7,711	1,641	21.3	165,649	62,144	37.5	1,208,543	398,061	32.9
Electroplating	515	94	18.3	3,024	1,134	37.5	10,390	4,587	44.1
Engraving and diesinking	478	29	6.1	1,878	1,025	54.6	7,351	4,216	57.4
Flour-mill and gristmill products	10,708	2,667	24.9	45,481	34,841	76.6	2,052,434	1,713,800	83.5
Fur goods	1,815	213	11.7	13,639	4,866	35.7	173,138	52,199	30.1
Liquors, vinous	342	40	11.7	1,011	709	70.1	17,454	12,236	70.1
Lumber and timber products	26,119	3,829	14.7	480,945	351,830	73.2	1,387,471	1,050,373	75.7
Marble and stone work	4,240	762	18.0	32,768	20,599	62.9	129,165	67,947	52.6
Millinery and lace goods	3,005	651	21.7	50,850	23,456	46.1	255,725	120,016	46.9
Printing and publishing, book and job	13,089	3,367	25.7	123,005	90,486	73.6	597,663	445,041	74.5
Saddlery and harness	1,823	253	13.9	10,411	7,434	71.4	83,713	61,653	73.6
Tobacco, cigars and cigarettes	9,926	796	8.0	138,773	96,849	69.8	773,662	639,487	82.7
Turpentine and rosin	1,191	247	20.7	28,067	11,552	41.2	53,051	24,946	47.0
Hats and caps, other than felt, straw, and wool	709	137	19.3	7,539	3,017	40.0	44,540	16,264	36.5
Iron and steel, tempering and welding	520	101	19.4	1,835	1,103	60.1	10,996	7,248	65.9
Models and patterns, not including paper patterns	928	145	15.6	6,949	3,160	45.5	25,300	12,034	47.6
Vinegar and cider	720	135	18.7	1,981	1,441	72.7	24,723	18,285	74.0

certain of the Northern Central States large proportions of the establishments in the dairy industry are operated by these cooperative societies. The cooperative printing and publishing concerns are controlled in most cases by societies, lodges, clubs, or labor unions.

See also:
"Medieval and Early Modern Business Associations," page 154.
"Forms of Combination and Agreement," page 893.
"The Corporation as an Instrument of Concentration," page 894.
"Other Instruments of Concentration," page 902.

CHAPTER IV

MODERN CAPITAL GOODS EXEMPLIFIED BY POWER AND THE MACHINE

Purposes of this chapter:

1. To see how man's material culture conditions production.
2. To inquire especially into the part played by capital goods, both active and passive.
3. To examine the contribution of the power-driven machine as a type of active capital goods.
4. To see some of the manifestations of modern technological methods in typical industries.
5. To sketch certain consequences of these modern technological methods.

The preceding chapter dealt with the fact that the economic order is but an aspect of our total culture and it emphasized especially the influence of our non-material culture upon production. In the present chapter we continue the discussion of the influence of our culture upon production, emphasizing the influence of our material culture—as represented, for example, by our buildings, tools, machines, power devices, and live stock. As was noted on page 336 this classification of culture as material and non-material culture is arbitrary and unreal, being justified only as it may facilitate discussion.

A still further bit of classification, drawing a distinction between consumers' goods and producers' goods, will give sharpness to our vision. Our present interest in the physical impedimenta of civlization centers in the part they play in conditioning production. Now, some of these physical goods are in the hands of the ultimate consumer, and in a very real sense the food, shelter, clothing, furniture, carriages, etc., which are in the hands of the ultimate consumer do condition production. But, having recognized this fact, and having accepted the term "consumers' goods" (some persons prefer to call them "consumers' capital goods") as applicable to these goods, it is permissible to pass them by with little further thought on the ground that their

significance is self-evident. The rest of the physical equipment of civilization is in the hands of "producers," and the terms "inchoate wealth" (wealth not yet come to fruition) or "producers' goods" or "capital goods" are commonly applied to such goods. Their significance in the productive process is not so self-evident and they are accordingly given rather extensive treatment.

Still a further distinction. For many purposes it is helpful to differentiate between (*a*) those capital goods which are "passive" in the production process and (*b*) those which "act upon" these passive capital goods.

Typical classes of passive capital goods are goods-in-process (which are at their beginning stage *true* raw materials and are not infrequently called raw materials at every stage of processing); supplies (often called "indirect" material), such as fuel, lubricating oil, cratings, wrappings, etc.; certain types of live stock (which are a clear case of raw materials or goods-in-process when awaiting slaughter).

As compared with earlier cultures the modern economic order has at least three great advantages in this matter of passive capital goods. One advantage comes from the fact that modern science has greatly increased man's power to command materials. The science of chemistry has increased the availability of substitutes. Chemistry and other sciences have made nature more productive in yielding raw materials. A second advantage comes from the fact (noted in chap. ii) that any given group of men today can have at its command the raw materials of the whole world. Modern communication, transportation, and social organization have made this possible. The third advantage is that scientific standards and measurement have made possible a more effective utilization of the available stock of passive capital goods.

Typical classes of active capital goods are *plant*, including factory buildings, transportation roadbeds and tracks, telephone and telegraph lines, canals, bridges, etc.; *power devices*, including draft animals and the mechanical power devices connected with water power, steam power, gas power, electrical power, etc.; and *tools and machines*.

It has become a commonplace in our thinking that technology (the application of science to the arts of life) should be called upon

for aid in man's struggle with nature. In our present culture the range of these applications is very great, one classification[1] running thus: (1) conditioning processes, involving structural changes in materials, such as are readily exemplified by brickmaking and tanning; (2) extracting processes, involving the mechanical separation of some ingredient in a material, such as are readily exemplified by milling and sugar refining; (3) fabricating processes, involving the mechanical assembly of parts of materials into an organic whole, such as are exemplified by the making of shoes, clothing, furniture, paper, and pneumatic tires; (4) synthetic processes, involving the combination (usually chemical) of elements of materials in a homogeneous compound or mixture, such as are exemplified by canning, preserving, and cement-making; (5) analytic processes, involving chemical separation of materials into constituent elements or parts, such as are exemplified by oil refining and metallurgy; (6) manipulating processes, involving the mechanical change of the outward form of materials without structural transformation, such as are exemplified by lumbering and metal-working; and (7) electro-dynamic processes, involving the production, transmission, and conversion of electrical energy, such as are exemplified by power and light generation.

In such a vast field we must content ourselves with the study not of the whole territory but of some significant sample taken as a type case. The sample chosen lies in the mechanical field, the power-driven machine. Occasionally, by brief side excursions into other realms, we shall remind ourselves that this discussion of the technological applications of physics could be paralleled by similar discussions in the realms of other sciences and especially in chemistry and bacteriology; but in the main we must confine our study to this one type case.

A. The Power-Driven Machine

As we have seen, the tool chest of Neolithic man contained crude samples of substantially all the different *types* of tools which we use today. The outstanding difference in this respect between the two cultures is this: The tools of Neolithic man were made by rule of thumb; were of unsatisfactory materials; were set in the very simplest of machines (the hafted hatchet was a tool in a simple machine, the

[1] W. N. Mitchell, "The Place of Technology in the Business Curriculum," *Journal of Business of the University of Chicago*, Vol. I, No. 2 (April, 1928).

lever); and were seldom applied by any power other than man-power. Today our tools are made scientifically by the use of mathematical formulas and instruments of precision; are of vastly superior materials; have been multiplied in number and magnified in size and set in very complex mechanisms; and to these mechanisms have been applied vast mechanical powers through the use of the steam engine, the gas engine, the waterfall, and the electric motor. What this has meant in increased ability to cope with nature may be sensed from the fact that in the United States alone the mechanical power available must run well over one billion horse-power—equivalent to six billion mechanical slaves.

What has happened may be put this way. Man had no teeth that would serve him as well as those of the wolf and the tiger serve them. Very well. "He made for himself an artificial tooth. He took a stick and sharpened the end. He hardened this sharp point in the fire, or he inserted a piece of flint." Later, he hurled it by means of the bow. Much later, he put a "tooth" in the gun, and then no animal could compare with him. His arms were not strong. He "extended" his arms with tools, and then he multiplied his extended arms a thousand fold by setting the tools in machines and turning on the power.

So, also, man's legs were not as swift as those of the hare or the deer. His swimming was far poorer than that of the fish. Very well. He made for himself artificial legs and fins. These are seen today in the automobile, the locomotive, and the power boat. He had no wings, but today how powerful are his artificial wings! They carry him across the ocean or the continent. As for his messages, they move with the speed of light when he so wills.

The selections in this section should be read with the following issues[1a] in mind:

1. What does the tool contribute to production? Is it an aid in the control of nature's forces and powers? If so, in what respects?
2. What does the machine contribute to production? Is it an aid in the control of nature's forces and powers? If so, in what respects?
3. How can the *newness* of the power-driven machine be explained? What cultural steps had to be taken before it was possible?

[1a] A more detailed statement of issues may be found in *Outlines of the Economic Order*, pp. 93–101. (University of Chicago Press.)

4. What are the highly significant dates or happenings in the development of man's control of mechanical powers?
5. What are some of the more significant measures of the increase of productivity brought about by the power-driven machine?
6. Does it seem likely that man is now at the crest of his abilities in his control of natural forces?

1. A GENERAL VIEW OF MODERN TECHNOLOGY[1b]

Studies designed to deal with technology in business might deal with the following:

I. The scientific background of technology. Consideration of the natural sciences which form the background or source of all technological activity and an explanation of their relation to manufacturing.

CHART I

SUGGESTED OUTLINE OF THE SUBJECT MATTER OF THE TECHNOLOGY OF PRODUCTION

I. The Scientific Background		II. Technological Processes and Means	III. Industrial Applications
Geography Geology Zoölogy Botany	Natural resources	1. *Basic raw materials* (For suggested classification see Chart II)	The application of technological processes and means in specific industries with special emphasis on resulting commodities. (For suggested classification of the industries see Chart V.)
Chemistry Physics Bacteriology	Scientific phenomena	2. *Basic technological processes* (For suggested classification see Chart III)	
Theoretical and applied mechanics		3. *Mechanical aids (tools)* (For suggested classification see Chart IV)	

II. Basic technological processes and means. Considered from three angles: (*a*) Raw materials or natural resources. (*b*) Basic processes, which are in reality the application of principles formulated by the chemist, physicist, and bacteriologist. (*c*) Tools, which are the mechanical means employed in applying the basic processes to the transformation of resources into usable goods.

III. Applications to specific industries with particular emphasis upon the resulting commodities of commerce. An attempt to classify industries both as to the thing acomplished, the commodity, and the method employed in accomplishing it. An explanation of how the

[1b] Adapted from W. N. Mitchell, "The Place of Technology in the Business Curriculum," *Journal of Business of the University of Chicago*, I, No. 2 (April, 1928), 230–36.

methods and means considered under II are utilized in the production of finished commodities.

This outline is elaborated in Chart I, in which the three main divisions just mentioned are shown in parallel columns. The first merely lists the natural sciences upon which technology is based.

CHART II

CLASSIFICATION OF BASIC RAW MATERIALS REFERRED TO IN CHART I

- Minerals
  - Metallic ores
    - Ferric
    - Non-ferric
      - Copper
      - Zinc
      - Lead
      - Tin
      - Aluminum
      - Gold
      - Silver
  - Non-metallic materials
    - Stone
    - Sand
    - Clay
    - Coal
    - Mineral oils and tars
- Agricultural
  - Animal
    - Hides and skins
    - Fibers
    - Meat
    - Milk
    - Oils and fats
    - Misc. by-products
  - Vegetal
    - Cereals
    - Fibers
    - Gums, oils, and juices
    - Fruits
    - Edible vegetables
    - Medicinal plants and herbs
- Nemoracultural
  - Lumber
  - Pulp
  - Misc. forest products
- Fishing and trapping
  - Fish
  - Skins and furs
  - Oils
- Non-material resources
  - Water power

The basic processes are considered from three essential angles. The first (II, a) dealing with natural resources as elaborated in Chart II, and representing applications of geography, botany, geology, and closely allied sciences, might possibly consist of an investigation of such matters as the relative importance and significance of leading resources, their natural origins, the influence of this natural distribu-

CHART III

Classification of Basic Technological Processes Referred to in Chart I

Chemical	Simple chemical interactions		Bleaching and dyeing (some) Precipitation (some) Saponification Corrosion Double decomposition (where not included in above)
	Physico-chemical interactions	Pyro-chemical	Combustion Baking Calcination Cooking Reduction Vitrification Metallic compounds
		Photo-chemical	
		Electro-chemical	Electrolysis
Physical	Thermo-physical interactions		Annealing Calendering Tempering Condensation Vaporization Fusion Solidification
	Electro-physical interactions		Electro-magnetic Electro-thermal
	Physico-molecular interactions		Absorption Infusion Crystallization Solution (sometimes chemical)
	Purely mechanical form changes		Abrasion Compression Cutting Extruding Forging Pulverizing Pulping Rolling
	Mechanical-manipulative processes		Aeration Assembly Coating Felting Imprinting Mixing Spinning Weaving Calibrating
	Mechanical-separative processes		Centrifugal Filtration Flotation Sifting
Bacteriological	Bacteria culture		Fermentation Putrefaction
	Bacteria destruction		Sterilization Refrigeration Antiseptic Desiccation

CHART IV

Classification of Mechanical Aids or Tools Referred To in Chart I

Class	Group	Devices	
Power provision devices	Power generation (prime movers and secondary apparatus)	Steam engines (and boilers)	
		Internal combustion engines	
		Hydraulic engines	
		Dynamos	
		Compressors and vacuum pumps	
	Power transmission and storage	Storage batteries	
		Electric transmission	Wiring
			Transformers
			Condensers
			Motors
		Belts and shafting	
		Pressure tanks and pipe lines	
Temperature manipulation devices	Heating devices	Blast furnaces	
		Open hearth furnaces	
		Reverberatory furnaces	
		Retorts and converters	
		Ovens and kilns	
		Cookers	
		Boilers	
	Cooling devices	Condensers	
		Atomizers	
		Radiators	
		Fans	
Material fashioning devices	Pressure shaping tools	Hammers	
		Presses	
		Rolling mills	
		Inflaters and deflaters	
	Molding tools	Molds, cores, etc.	
	Cutting tools	Shears	
		Saws	
		Planers and millers	
		Lathes	
		Drills and boring mills	
		Punch presses	
	Abrasive tools	Polishing and grinding wheels	
		Sanding belts	
Material combination and separation devices	Fabricating tools	Sewing machines	
		Riveting and welding machines	
	Fiber weaving tools	Looms	
		Spinning frames	
		Felting machines	
		Knitting machinery	
	Coating and printing tools	Dipping vats	
		Sprayers	
		Printing presses	
	Crushing and mixing tools	Crushers and grinding mills	
		Mixers	
	Separators and graders	Centrifugal separators	
		Bolting and sifting machines	
		Settling basins and filters	
		Stills	
Material handling devices	Transportation tools	Cranes and derricks	
		Trucks, cars, and trailers	
		Mechanical conveyors	
		Pumps and pipe lines	
		Blowers	
	Containers	Tanks	
		Vats	
		Bins, etc.	

CHART V

Classification of Industries Referred To in Chart I

Processes	Industries
Conditional processes—involving structural changes	Brick making Tanning Dairy products Ice Bleacheries Pulp mills
Extractive processes—involving the mechanical separation of some ingredient	Milling Sugar Syrups Starch Vegetable oils Salt Chemicals (some)
Fabricative processes—involving the mechanical assembly of parts in an organic whole	Machine building Textiles: Wool, Cotton, Silk, Cordage Paper Furniture Precision instruments Musical instruments Shoe manufacture Clothing manufacture Tires, rubber goods
Synthetic processes—involving the combination (usually chemical) of elements resulting in a homogeneous compound or mixture	Fertilizer Soap Cement Bread and pastry Confectionery Alloys Glass Paint and varnish Glue Canning and preserving Chemicals (some) Explosives and pyrophoric materials
Analytic processes—involving chemical separation into constituent elements or parts	Metallurgical: Iron, Copper, Lead, Zinc, Tin Coke and gas Oil refining Chemicals (some) Drugs (some)
Manipulative processes—involving the mechanical change of outward form without structural transformation	Lumbering Stone working Slaughtering and meat packing Tobacco manufacturing Printing Photography and lithography Lapidary Paper goods—box Metal working: Rolling mills, Machine shops, Foundries, Forge shops
Electro-dynamic processes—involving the production, transmission, and conversion of electrical energy	Power and light generation

tion upon the development of our transportation and marketing agencies, and in turn the influence of existing transportation agencies upon their utilization, existing property rights in these resources, their influence upon past and probably future trends of industrial development and localization, and kindred topics.

The second subsection (II, b) represents an attempt to classify and trace the scientific origin of basic technological processes, as indicated in Chart III. Many of these processes, it will immediately be noted, are common to widely different industries.

The third subsection (II, c) deals with a classification of tools of industry, as shown in Chart IV. In this part of the study the function and operating characteristics of typical mechanical devices, their general significance and the extent to which they supplement human labor, their limitations, and the new problems which their utilization has introduced for employer and employee might be presented.

Section III suggests the possibility of applying all three elements appearing in section II to specific industrial situations, with particular emphasis upon their influence with respect to properties and characteristics of commodities which form the subject matter of commerce. A possible classification of industries is presented in Chart V.

See also "Scientific Research and Natural Resources," page 323.

2. THE SIGNIFICANCE OF THE MACHINE TOOL[2]

With the coming of the Industrial Revolution, we find for the first time production being carried on by machinery in factories. Why had this not happened earlier? The capitalistic form of society had been in existence for over two hundred years; machines had been used, even if only in small numbers and in isolated instances; men had learned how to transfer skill and intelligence to their tools as soon as they learned to make tools; the printing press is a noble example of transfer of skill to the machine, and printing with movable type was over three hundred years old when the series of changes called the Industrial Revolution began; blast furnaces had been used before 1400. With so much by way of preparation, why did the Industrial Revolution wait until the latter half of the eighteenth century?

[2] By B. E. Goetz.

There is a good and sufficient reason why no invention prior to the textile inventions expanded rapidly enough to be referred to as a "revolution." Until that time machines just couldn't be made fast enough to revolutionize an industry. There were no machines to make machines and in many cases the cost of making machines by hand was prohibitive. The lathes of that day could not turn iron and steel. Flat surfaces could not be made. Forgings were laboriously pounded out by hand. In fine, it happened historically that *the textile machines were invented about the same time that methods of making them were developed*—about the same time that machine tools came into being. These made it possible for the textile inventions to sweep the country just as they made the steam engine possible.

The last three decades of the eighteenth century saw a vast development of machines (the so-called "machine tools") whose chief purpose was to make machines. Most machines are made of metal; therefore, a machine-building machine must be able to work metal. Wilkinson's boring bar was the first of such machines. It was built by a great mechanic to bore the cylinders of Watt's steam engine. It wasn't accurate according to modern standards but it was marvelously so according to the standards of the time. In thirty years' time a succession of great mechanics had invented almost the whole list of machine tools that we use today, and had put most of them in essentially their modern form. These great mechanics all knew each other; indeed, most of them got their start in machine-building by working for a few of the early men in the field.

It sometimes puzzles people where the vast increase in fixed capital during the Industrial Revolution came from. It came in large part from these men who were ironsmiths with considerable contact with the physical sciences of the day. They designed and built their own machines, their own fixed capital; they built machines to expand their plants so they could build more machines more rapidly. They built machines to do all sorts of work and sold them to other industries. With the money acquired in this way they hired assistants. The assistants were trained in building machines and in designing new machines and eventually left to set up shops of their own, either buying their initial machines from their masters or building their own. This expansion of fixed capital was no slow process of gradual accumula-

tion. It was a very rapid process of capital being built right from the raw materials.

Great quantities of machinery could not come into existence without machine-building machines. The modern factory system requires huge amounts of machinery. The steam engine, any machines requiring considerable accuracy at low cost, could not come into existence until there were machines to build them. Consequently there is much justice in saying that the Industrial Revolution began with the inventions of the first machine tools.

The machine tools are the only class of reproducing machines. A power loom can weave cloth but it cannot give birth to new power looms. The power loom in combination with any other machines would not aid in building new power looms. It is also true that a single machine tool, the lathe, for example, cannot reproduce itself, but the lathe with the aid of other machines in the machine tool group can build new lathes. The machine tool group as a whole does reproduce. Among the members of the group any of them can be constructed.

In addition to this peculiar power of reproducing themselves, the machine tools are used in building all other kinds of machinery. Engineering practice restricts the term "machine tools" to the machines used in a machine shop. These are metal-cutting machines and the list runs thus:

The lathe, used for turning cylinders, cones, screws, etc.
The planer, and the shaper, used for making flat surfaces.
The gear cutting machine.
The milling machine, used for nearly any kind of metalcutting work—sometimes more expensive and no better than the above-mentioned machines.
The grinding machine will do much the same work as the milling machine but much more accurately and more expensively.
The boring mill, the slotting machine, the drill press, and others are modifications of the above machine.

To arrive at the full significance of all these machine tools we shall do well also to include other metal working machines such as the power-hammers, rolling-mills, punch presses, and today, perhaps, the molding machines used in the metal foundry.

Any industry using machines is directly dependent upon the machine tool for its physical equipment. Practically all industries today use machinery. Most of them use great quantities of it. Even those

that do not are dependent on machine-tool-built methods of transportation, on sources of raw materials, on markets that are so dependent on the machine tool.

Most large plants have extensive repair departments. Here again the machine tool is supreme. In making new parts, in repairing old, in refitting worn parts, the metal-working machine is a necessity.

3. THE SERVICES OF THE NEW TECHNOLOGY

A. THE GAINS OF ROUNDABOUT PRODUCTION[3]

I am short-sighted, and wish to have a pair of spectacles. For this I require ground and polished glasses and a steel framework. But all that nature offers towards that end is silicious earth and iron ore. How am I to transform these into spectacles? Work as I may, it is as impossible for me to make spectacles directly out of silicious earth as it would be to make the steel framework out of iron ore. Here there is no immediate or direct method of production. There is nothing for it but to take the roundabout way, and, indeed, a very roundabout way. I must take silicious earth and fuel, and build furnaces for smelting the glasses from the silicious earth; the glass thus obtained has to be carefully purified, worked, and cooled by a series of processes; finally, the glass thus prepared—again by means of ingenious instruments carefully constructed beforehand—is ground and polished into the lens fit for short-sighted eyes. Similarly I must smelt iron in the blast furnace, change the raw iron into steel, and make the frame therefrom —processes which cannot be carried through without a long series of tools and buildings that, on their part again, require great amounts of previous labour. Thus, by an exceedingly roundabout way the end is attained.

In the last resort all our productive efforts amount to shiftings and combinations of matter. We must know how to bring together the right forms of matter at the right moment, in order that from those associated forces the desired result, the product wanted, may follow. But, as we saw, the natural forms of matter are often so infinitely large, often so infinitely fine that human hands are too weak or too coarse to control them. We are as powerless to overcome the cohesion

[3] Adapted by permission from Eugene von Böhm-Bawerk, *The Positive Theory of Capital*, pp. 18–22. (Macmillan and Co., Ltd., 1891.)

of the wall of rock when we want building stone as we are, from carbon, nitrogen, hydrogen, oxygen, phosphor, potash, etc., to put together a single grain of wheat. But there are other powers which can easily do what is denied to us, and these are the powers of nature. There are natural powers which far exceed the possibilities of human power in greatness, and there are other powers in the microscopic world which can make combinations that put our clumsy fingers to shame. If we can succeed in making those forces our allies, in the work of production, the limits of human possibility will be infinitely extended. And this we have done.

Often, of course, we are not able directly to master the form of matter on which the friendly power depends, but in the same way as we would like it to help us, do we help ourselves to gain it; we try to secure the alliance of a second natural power which brings the form of matter that bears the first power under our control. Just as we control and guide the immediate matter of which the good is composed by one friendly power, and that power by a second, so can we control and guide the second by a third, the third by a fourth, this again by a fifth, and so on—always going back to more remote causes of the final result—till in the series we come at last to one cause which we can control conveniently by our natural powers. This is the true importance which attaches to our entering on roundabout ways of production, and this is the reason of the result associated with them; every roundabout way means the enlisting in our service of a power which is stronger or more cunning than the human hand; every extension of the roundabout way means an addition to the powers which enter into the service of man, and the shifting of some portion of the burden of production from the scarce and costly labour of human beings to the prodigal powers of nature.

And now we may put into words an idea which has long waited for expression, and must certainly have occurred to the reader; the kind of production which works in these wise circuitous methods is nothing else than what economists call Capitalist Production, as opposed to that production which goes directly at its object, as the Germans say, "mit der nackten Faust." And Capital is nothing but the complex of intermediate products which appear on the several stages of the roundabout journey.

See also:

"A Sketch of the Development of Science," page 348.

"Four Stages in the Development of the Use of Knowledge," page 354.

"The Engineering Profession," page 356.

B. WHAT THE MACHINE IS[4]

All fully developed machinery consists of three essentially different parts, the motor mechanism, the transmitting mechanism, and finally the tool or working machine. The motor mechanism is that which puts the whole in motion. It either generates its own motive power, like the steam engine, the caloric engine, the electro-magnetic machine, etc., or it receives its impulse from some already existing natural force, like the water-wheel from a head of water, the windmill from wind, etc. The transmitting mechanism, composed of fly-wheels, and shafting, toothed wheels, pullies, straps, ropes, bands, pinions, and gearing of the most varied kinds, regulates the motion, changes its form where necessary, as for instance from linear to circular, and divides and distributes it among the working machines. These two first parts of the whole mechanism are there solely for putting the working machines in motion, by means of which motion the subject of labour is seized upon and modified as desired. The tool or working-machine is that part of the machinery with which the industrial revolution of the eighteenth century started. And to this day it constantly serves as such a starting-point, whenever a handicraft, or a manufacture, is turned into an industry carried on by machinery.

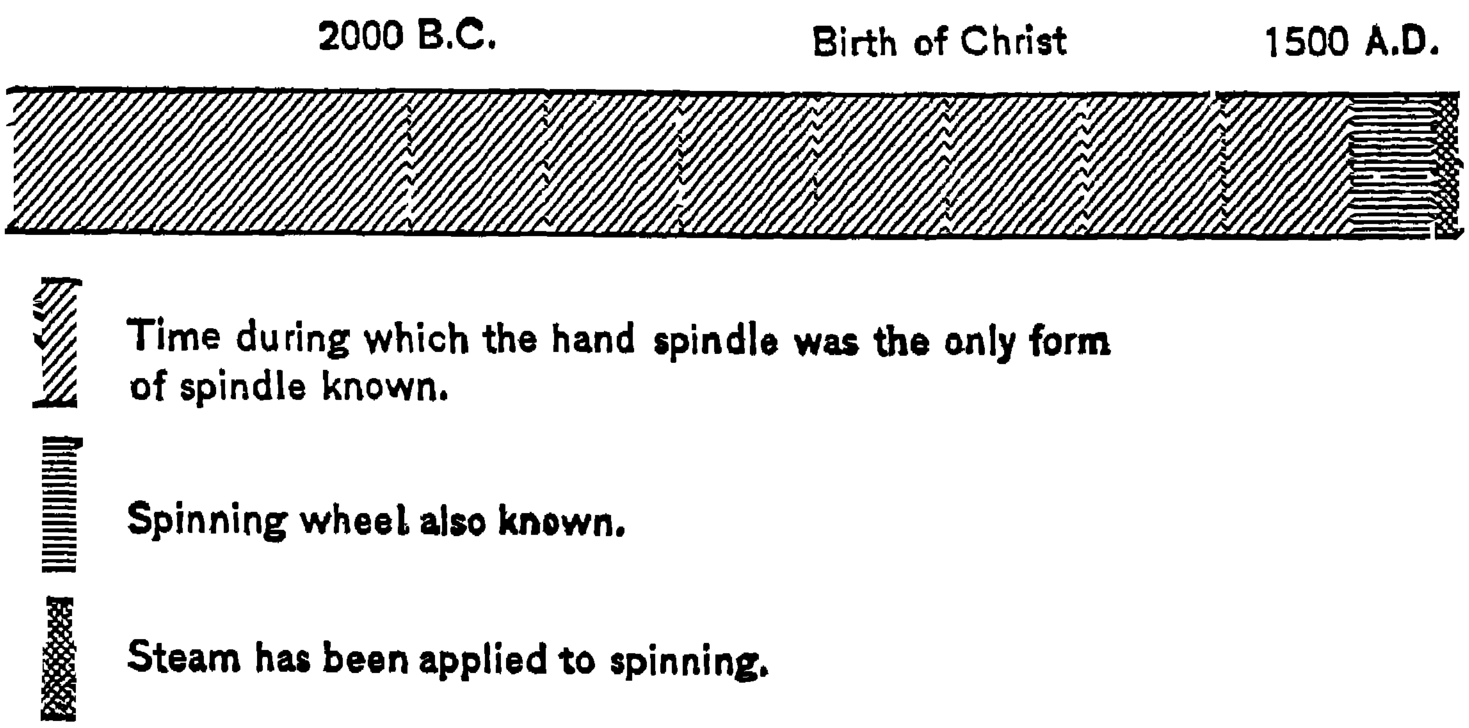
On a closer examination of the working-machine proper, we find in it, as a general rule, though often, no doubt, under very altered forms, the apparatus and tools used by the handicraftsman or manufacturing workman; with this difference, that instead of being human implements, they are the implements of mechanism, or mechanical implements.

An organized system of machines, to which the motion is communicated by the transmitting mechanism from a central automaton, is the most developed form of production by machinery. Here we have,

[4] Adapted by permission from Karl Marx, *Capital*, I, 405–18. (Charles H. Kerr & Co., 1909.)

in the place of the isolated machine, a mechanical monster whose body fills whole factories, and whose demon power, at first veiled under the slow and measured motions of his giant limbs, at length breaks out into the fast and furious whirl of his countless working organs.

Just as the individual machine retains a dwarfish character, so long as it is worked by the power of man alone and just as no system of machinery could be properly developed before the steam engine took the place of the earlier motive powers, animals, wind, and even water; so, too, Modern Industry was crippled in its complete develop-



THE BRIEF REIGN OF THE MACHINE

ment so long as its characteristic instrument of production, the machine, owed its existence to personal strength and personal skill, and depended on the muscular development, the keenness of sight, and the cunning of hand with which the detail workmen in manufactures, and the manual labourers in handicrafts, wielded their dwarfish implements.

See also "The Hazardous Nature of Modern Industry," page 604.

C. FUNCTIONS AND STRIKING OPPORTUNITIES OF MACHINERY[5]

Man does his work by moving matter. Hence machinery can only aid him by increasing the motive power at his disposal.

1. Machinery enables forces of man or nature to be more effec-

[5] Taken by permission from J. A. Hobson, *The Evolution of Modern Capitalism*, pp. 72–74; 90–92. (The Walter Scott Publishing Co., Ltd., 1912.)

tively applied by various mechanical contrivances composed of levers, pulleys, wedges, screws, etc.

2. Machinery enables man to obtain the use of various motor forces outside his body—wind, water, steam, electricity, chemical action, etc.

Thus by the provision of new productive forces, and by the more economical application of all productive forces, machinery improves the industrial arts.

Machinery can increase the scope of man's productive ability in two ways. The difficulty of concentrating a large mass of human force upon a given point at the same time provides certain quantitative limits to the productive efficiency of the human body. The steam-hammer can perform certain work which is quantitatively outside the limit of the physical power of any number of men working with simple tools and drawing their motor power from their own bodies. The other limit to the productive power of man arises from the imperfect continuity of human effort and the imperfect command of its direction. The difficulty of maintaining a small, even, accurate pressure, or a precise repetition of the same movement, is rather a qualitative than a purely quantitative limit. The superior certainty and regularity of machinery enables certain work to be done which man alone could not do or could do less perfectly. The work of the printing machine could not be achieved by man. Machinery has improved the texture and quality of certain woolen goods; recent improvements in milling result in improved quality of flour, and so on. Machinery can also do work which is too fine or delicate for human fingers, or which would require abnormal skill if executed by hand. Economy of time, which Babbage accounts a separate economy, is rightly included in the economies just named. The greater rapidity with which certain manufacturing processes—e.g., dyeing—can be achieved arises from the superior concentration and continuity of force possible under machinery. All advantages arising from rapid transport are assignable to the same causes.

The continuity and regularity of machine work are also reflected in certain economies of measurement. The faculty of self-registering, which belongs potentially to all machinery, and which is more utilised every day, performs several services which may be summed up by saying that they enable us to know exactly what is going on. When to

self-registration is applied the faculty of self-regulation, within certain limits a new economy of force and knowledge is added. But machinery can also register and regulate the expenditure of human power. Babbage well says: "One of the most singular advantages we derive from machinery is in the check which it affords against the inattention, the idleness, or the knavery of human agents." This control of the machine over man has certain results which belong to another aspect of machine economy.

See also:
"The Transfer of Thought, Skill, and Intelligence," page 555.
"Standardization and the Machine Process," page 557.

4. THE INCREASE OF ACTIVE CAPITAL IN THE UNITED STATES

A. GENERAL STATEMENT[6]

In Table I we have an attempt to collect the various figures of the United States Census and combine them into a harmonious whole. While the numbers are, in no case, exact, it is believed that the errors are too small to vitiate any of the following conclusions. We see that the total supply of active capital has enormously increased; in fact, that in 1910 the value was about seventeen times as great as in 1850. In this great increase, all industries have participated, but the fishing equipment has grown most slowly and the transportation facilities fastest of all. At no census year has there been a recession in a single industry—development has been continuous in all lines.

SIXTY YEARS OF INCREASE OF CAPITAL GOODS

There was in the United States in 1910 five times as much per capita of capital goods in fisheries, in live stock, machinery, tools, implements, railroads, business buildings, and improvements as there was in 1850. Noticethat this is true per capita.

But an increase in the total value of active capital is not, in itself, significant. It must be compared with

[6] Adapted by permission from W. I. King, *The Wealth and Income of the People of the United States*, pp. 42–44. (The Macmillan Co., 1915.)

the increase in population and with a changing price-level before we can arrive at any conclusions concerning the influence of the change upon the social welfare. The third column in Table II indicates that

TABLE I

THE ESTIMATED VALUE OF THE SUPPLY OF ACTIVE CAPITAL IN THE CONTINENTAL UNITED STATES, IN MILLIONS OF DOLLARS

Census Year	Total	Business Buildings and Fixed Improvements	Railroads and Other Public Utilities	Movable Machinery, Tools, and Implements	Livestock	Fisheries
1850...........	2,757	1,113	639	399	599	7
1860...........	5,900	2,160	1,868	665	1,198	9
1870...........	8,978	2,975	3,109	1,206	1,678	10
1880...........	13,636	4,117	5,386	2,373	1,735	25
1890...........	19,298	5,700	8,366	2,665	2,538	29
1900...........	24,783	7,250	10,926	4,006	3,197	34
1910...........	47,961	13,301	23,319	5,995	5,296	50

the per capita value of active capital has steadily grown larger until, in 1910, it has become more than four times as great as in 1860. Only in the Civil War period has this apparent increase been due wholly to

TABLE II

QUANTITY OF ACTIVE CAPITAL IN THE UNITED STATES
(Outlying possessions excluded)

Census Year	Total Value of the Active Capital Supply in Millions of Dollars	Per Capita Value of Active Capital	Price Index	Index of Quantity of Capital per Capita
1850................	2,757	$119	139.2	85
1860................	5,900	188	141.3	133
1870................	8,978	233	221.6	105
1880................	13,636	272	132.4	205
1890................	19,298	307	113.6	270
1900................	24,783	326	101.7	321
1910................	47,961	521	126.5	412

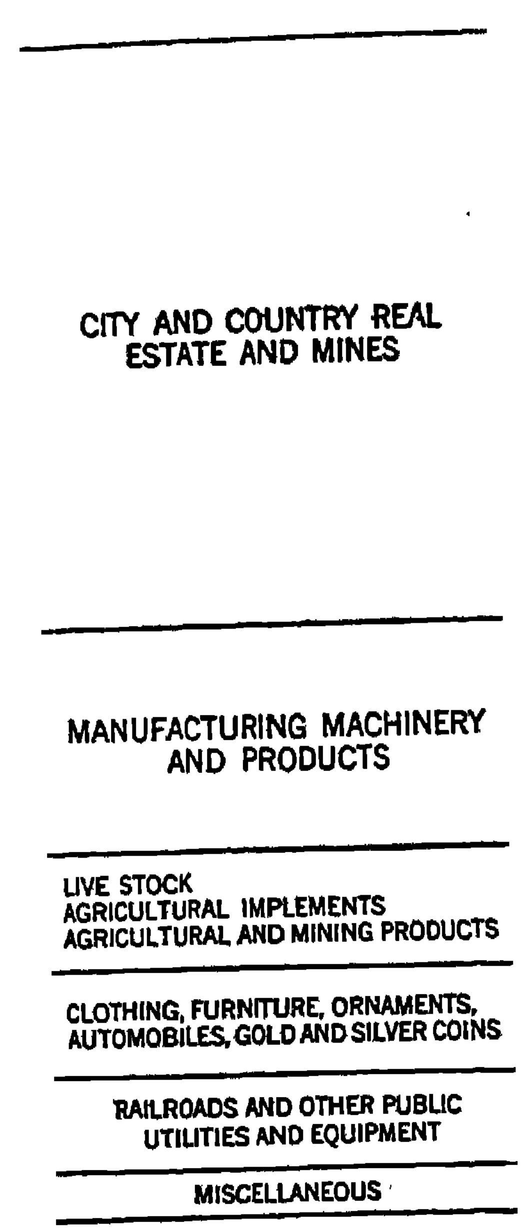
changing prices, for, if the per capita value is divided by the price index, we obtain an index of amount which climbs upward until the quantity per capita existing in 1850 is more than quadrupled. The only backward step shown is in the decade 1860 to 1870, and this was due, probably, to the wholesale destruction of capital by the Civil War, a blow from which the Southern States had only begun to recover in

1870. The more or less chaotic conditions of the South in 1870 may also have resulted in some incompleteness in the Census returns.

See also "Power Developments in the United States," page 502.

B. ACTIVE CAPITAL IN MANUFACTURING[7]

The census of manufactures has periodically included a question on the amount of capital invested in the various manufacturing enterprises and has tabulated the returns. This, however, includes in addition to fixed capital in the form of machinery and buildings, working capital including raw materials, goods in process of manufacture and finished goods in warehouses. It also includes land. We shall attempt to measure the changes in the physical quantity of (1) machinery, tools, and equipment and (2) factory buildings. The table gives an index of growth, taking the year 1899 as a base.



LEADING FORMS OF WEALTH IN THE UNITED STATES

It may be remarked that this index shows a truly unprecedented growth in the volume of fixed capital. Thus the amount virtually doubled during the decade from 1900 to 1909. This was a compounded average yearly rate of increase of 7 per cent. This same rate of increase was virtually maintained during the succeeding decade. From 1919 on the rate of growth slackened during the three succeeding years but while we have not computed the growth since 1922 it has beyond question increased greatly since then. Taken as a whole this period showed an approximate doubling in the quantity during every decade, which would probably be scaled down to about 6 per cent per year compounded if deductions were made

[7] Adapted by permission from Charles W. Cobb and Paul H. Douglas, "A Theory of Production," in the March, 1928, supplement of the *American Economic Review*.

for the increased cost of replacing the old capital. This is a rate of growth which it is believed has not been matched by any other country. It will be remembered that Cassel estimates the rate of growth of capital in Western Europe at 3 per cent a year. If this is true, the rate

ESTIMATED ANNUAL ADDITIONS TO FIXED CAPITAL IN MANUFACTURING, TOGETHER WITH CUMULATIVE TOTAL CAPITAL AS EXPRESSED IN TERMS OF COST AND 1880 PRICES
(Millions of dollars), 1899–1922

Year	Annual Increase in Terms of 1880 Dollars	Total Fixed Capital in 1880 Dollars	Relative Total Capital 1889 = 100
1899	387	4,449	100
1900	297	4,746	107
1901	315	5,061	114
1902	383	5,444	122
1903	362	5,806	131
1904	326	6,132	138
1905	494	6,626	149
1906	611	7,237	163
1907	595	7,832	176
1908	397	8,229	185
1909	591	8,820	198
1910	420	9,240	208
1911	384	9,624	216
1912	443	10,067	226
1913	453	10,520	236
1914	353	10,873	244
1915	967	11,840	266
1916	1,402	13,242	298
1917	1,673	14,915	335
1918	1,350	16,265	366
1919	969	17,234	387
1920	884	18,118	407
1921	424	18,542	417
1922	650	19,192	431

of industrial capital growth in the United States has been twice as great while if the growth be reckoned on a per capita basis, the disparity is even greater.

See also:
"Estimated National Wealth of the United States," page 277.
"A Classification of Production Elements," page 283.
"An Index of Energy Consumption," page 500.
"Power Developments in the United States," page 502.

5. THE PRODUCTIVITY OF MACHINERY

A. IN AGRICULTURE[8]

The number of days' work of man-labor requisite for producing the specified crops by the aid of machine power, together with the quantity of those several crops which the same labor-power could have produced by the earlier hand method, is shown in the following:

Name	Crop Of	Quantity Produced	Days' Work of Man-Labor Required	The Same Labor-Power	
				By Methods of	Could Have Produced
Barley....	1896	69,695,223 bu.	630,354	1829–30	2,972,839 bu.
Corn......	1894	1,212,770,052 bu.	45,873,027	1855	473,528,022 bu.
Cotton....	1895	7,161,094 500-lb.bales	28,178,904	1841	2,518,972 bales
Hay......	1895	47,078,541 tons	18,556,791	1850	8,801,640 tons
Oats......	1893	638,854,850 bu.	11,334,266	1830	68,433,307 bu.
Potatoes...	1895	297,237,370 bu.	5,134,100	1866	103,703,321 bu.
Rice......	1895	168,685,440 lbs.	108,889	1870	46,303,587 lbs.
Rye......	1895	27,210,070 bu.	2,739,147	1847–48	10,872,795 bu.
Wheat....	1896	427,684,346 bu.	7,099,560	1829–30	23,245,490 bu.

Finding next the difference between the quantities of the several crops actually produced under machine methods in the years indicated, and the quantities which the labor-power requisite for their production with the aid of machines could have produced had it been devoted to the production of those same crops by hand methods, we have the following:

Name	Crop Of	Due to Use of Machinery	Percentage of Actual Product
Barley...........	1896	66,722,384 bu.	95.7
Corn............	1894	739,242,030 bu.	60.9
Cotton...........	1895	4,642,122 bales	64.8
Hay............	1895	38,276,901 tons	81.3
Oats............	1893	570,421,543 bu.	89.2
Potatoes.........	1895	193,534,049 bu.	65.1
Rice............	1895	122,381,853 lbs.	72.5
Rye.............	1895	16,337,275 bu.	60.0
Wheat..........	1896	404,438,856 bu.	94.5

The increased effectiveness of man-labor power when aided by the use of machinery, as indicated by these figures, varies from 150 per

[8] Adapted by permission from H. W. Quaintance, "The Influence of Farm Machinery on Production and Labor," *Publications of the American Economic Association*, Third Series, Vol. V (1904), No. 4, pp. 21–23.

cent in the case of rye to 2,244 per cent in the case of barley. From this point of view, a machine is not a labor-saving but rather a product-making device. Taking the percentage of labor saved as indicating the average proportion of these crops due to the use of machinery, it appears that the quantity of product is almost five times as great per unit of labor as it formerly was.

It will be sufficient, for purposes of illustration, to consider only a few of the principal crops in the production of which machinery has become a recognized factor. The crops selected for this purpose, together with the time of man-labor requisite for producing stated quantities of each crop by hand and by machine methods, as reported by the Department of Labor, are shown in the following table:

Name and Quantity of Crop Produced and Description of Work Done	Year of Production		Time Worked			
			Hand		Machine	
	Hand	Machine	Hrs.	Min.	Hrs.	Min.
Barley: 30 bushels (1 acre) barley...	1829–30	1895–96	63	35.0	2	42.8
Corn: 40 bushels (1 acre) yellow corn, husked; stalks left in field.........	1855	1894	38	45.0	15	7.8
Cotton: By hand, 750 pounds; by machine 1000 pounds (1 acre) seed cotton..........................	1841	1895	167	48.0	78	42.0
Hay: Harvesting 1 ton (1 acre) timothy hay......................	1850	1895	21	5.0	3	56.5
Oats: 40 bushels (1 acre) oats.......	1830	1893	66	15.0	7	5.8
Potatoes: 220 bushels (1 acre) potatoes	1866	1895	108	55.0	38	......
Rice: 2640 pounds (1 acre) rough rice.	1870	1895	62	5.0	17	2.5
Rye: 25 bushels (1 acre) rye........	1847–48	1894–95	62	58.9	25	10.0
Wheat: 20 bushels (1 acre) wheat....	1829–30	1895–96	61	5.0	3	19.2

See also:

"The Recent Increased Efficiency of American Industry," page 926.

"Increase in Productivity Measured in Income Figures," page 934.

"Causes of Our Recent Increase in Productivity," page 943.

B. IN MANUFACTURES*

Name	Article Produced or Work Accomplished: Description, Hand	Description, Machine	Quantity	Year of Production: Hand	Year of Production: Machine	Different Operations Performed: Hand	Different Operations Performed: Machine	Different Workmen Employed: Hand	Different Workmen Employed: Machine	Time Worked, Hand: Hours	Time Worked, Hand: Minutes	Time Worked, Machine: Hours	Time Worked, Machine: Minutes	Labor Cost: Hand	Labor Cost: Machine
Boots.....	Men's cheap grade, kip, pegged boots, half-double soles	Men's cheap grade, kip, pegged boots, half-double soles	100 pairs	1859	1895	83	122	2	113	1,436	40.0	154	4.9	$408.5000	$35.4008
Shoes......	Men's fine grade, calf, welt, lace shoes, single soles, soft box toes	Men's fine grade, calf, welt, lace shoes, single soles, soft box toes	100 pairs	1865	1895	76	146	1	140	2,225	......	296	38.6	556.2496	74.3[illegible]
Shoes......	Men's medium grade, calf, welt, lace shoes, single soles, soft box toes	Men's medium grade, calf, welt, lace shoes, single soles, soft box toes	100 pairs	1863	1895	73	173	1	371	1,831	40.0	234	36.3	457.9164	59.5461
Shoes......	Men's grain, pegged, brogan shoes, tap soles	Men's grain, pegged, brogan shoes, tap soles	100 pairs	1855	1895	45	84	1	98	283	20.0	62	4.6	56.6668	13.8246
Shoes......	Women's fine grade, kid, welt, button shoes, single soles, patent-leather tips, soft box toes	Women's fine grade, kid, welt, button shoes, single soles, patent-leather tips, soft box toes	100 pairs	1875	1896	102	140	1	140	1,996	40.0	173	29.5	499.1664	54.6535
Shoes......	Women's cheap grade, kid, turned, lace shoes, single soles, plain toes	Women's cheap grade, kid, turned, lace shoes, single soles, plain toes	100 pairs	1858	1895	67	95	1	85	1,025	20.0	80	22.3	256.3332	18.5882
Shoes......	Women's cheap grade, grain, pegged, button shoes, single soles, plain toes	Women's cheap grade, grain, McKay sewed, button shoes, half-double soles, plain toes	100 pairs	1868	1895	56	98	2	269	538	20.0	83	10.7	109.3331	20.4435
Cottonades.	36-inch twilled cottonade, 2.18 yards per pound, filling doubled and twisted, 40×40 picks	28-inch twilled cottonade, 3.15 yards per pound, filling doubled and twisted, 60×40 picks	500 yards	1893	1895	19	43	3	252	7,534	1.5	84	14.1	135.6127	6.8118
Drills......	36-inch cotton drills, 2.92 yards per pound, 36×44 picks	30-inch cotton drills, 3.08 yards per pound, 72×44 picks	500 yards	1893	1896	14	29	3	90	5,031	42.6	79	20.3	88.0549	3.8991
Ginghams..	36-inch gingham checks, 2.5 yards per pound, 44×40 picks	27-inch gingham checks, 4.07 yards per pound, 48×40 picks	500 yards	1863	1895	18	43	3	152	5,844	43.3	72	42.0	102.2826	5.4477
Ginghams..	36-inch gingham plaids, 3.22 yards per pound, 40×36 picks	27-inch gingham plaids, 4.5 yards per pound, 52×44 picks	500 yards	1893	1895	15	45	3	283	5,038	36.6	63	53.1	50.3862	4.0286
Ginghams..	36-inch gingham stripes, 3.26 yards per pound, 36×32 picks	27-inch gingham stripes, 4.35 yards per pound, 44×52 picks	500 yards	1835	1895	16	40	3	166	5,130	12.5	119	14.2	174.4274	7.6882
Sheetings..	36-inch unbleached cotton sheeting, 3.18 yards per pound, 40×48 picks	36-inch unbleached cotton sheeting, 3 yards per pound, 48×48 picks	500 yards	1860	1897	14	53	3	282	5,605	......	52	45.6	84.0750	3.7217
Thread.....	2 [illegible] cotton, made from No. 6 yarn	No. 3 5-cord ball [illegible] cotton, made from No. 18 yarn	100 pounds	1870	1896	5	20	1	125	2,895	......	39	17.8	86.8500	1.8079
Yarn......	No. 12 cotton yarn	No. 12 cotton yarn	100 pounds	1896	1896	4	27	2	123	3,117	30.0	19	7.0	93.5250	1.2012

* From the *Thirteenth Annual Report of the Commissioner of Labor* (1898), I, 28–29, 40–41.

6. AN INDEX OF ENERGY CONSUMPTION[9]

The present index includes the raw energy consumed for all purposes, heat and light as well as mechanical power.

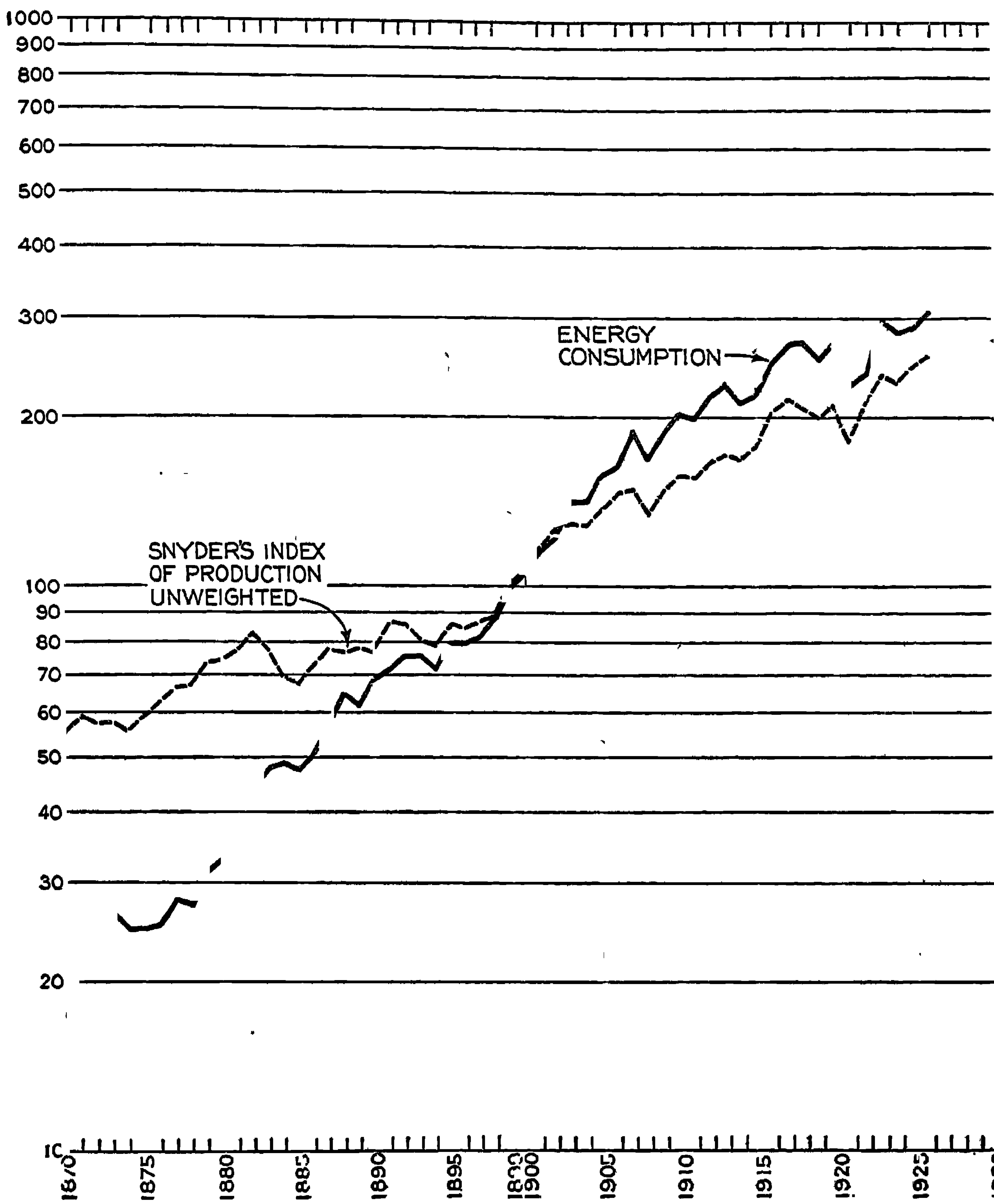
The heavy black line in the chart is an index of the quantity of energy materials consumed in the United States in each year from 1870 to 1926. The base is the year 1899. The index includes the mineral fuels consumed, and the coal equivalent of the power developed by water wheels, by work animals, and by windmills. It includes the charcoal used in blast furnaces, but not other forms of wood fuel. All of these fuels or fuel equivalents have been reduced to a common denominator in British thermal units.

In the chart the index, uncorrected for annual growth, is plotted on logarithmic scale alongside an unweighted index of production worked out by Dr. Carl Snyder. Snyder's is the only general index of the physical volume of production which has been carried back to 1870. It includes a varying number of items, beginning with 49 in 1870 and increasing to 86 in 1910. The items are unweighted. As originally presented by Mr. Snyder before the American Economic Association in 1920, the index was computed on a base of 1910–14 equals 100, which is here recomputed to base 1899 equals 100. The parallelism of the fluctuations in the two curves is fairly clear, even in the period before 1890, and this is the more remarkable because Snyder's index includes a number of agricultural products, which constitute a relatively large part of the forty-nine items used in the beginning of his series. I might add that when the energy index is plotted against Stewart's weighted index of the volume of manufactures for the period 1890 to 1899 and against Day's weighted indexes of manufactures and mining, as published in the *Harvard Review of Economic Statistics,* it shows the same harmony.

It will be seen that the rate of growth of the energy index is faster than that of the production index, and of course much faster than the growth of population. Whereas the physical volume of production has been found to increase at the rate of something like 4 per cent a year, the consumption of energy over much of the period shown was compounding at the rate of from 5 to 7 per cent a year.

[9] Adapted from F. G. Tryon, "An Index of Consumption of Fuels and Water Power," *Journal of the American Statistical Association,* September, 1927, pp. 274–79.

It is interesting to compare the growth of energy consumption with the growth of other measures of economic activity. Let us take



Unadjusted Index of Energy Consumption Compared with Snyder's Unweighted Index of Production, 1870–1926. Base, 1899 = 100.0

the period from 1899 to 1916, a period when fuel economy was progressing at a moderate but relatively constant rate. In that period the index of energy shows an increase of 150 per cent.

In the same period:

Population	Increased	36	per cent
Physical volume of agricultural production (Average 1914–18, Stewart)	"	32	" "
Physical volume of manufactures (Stewart)	"	130	" "
Physical volume of mining (Stewart)	"	156	" "
Railroad transportation (Stewart)	"	179	" "
Stewart's combined index of all production (agriculture, manufactures, mining, and transportation)	"	80	" "

The increase in energy consumption was thus four times as great as the increase in population, and nearly twice as great as the increase in the total volume of production. It was materially greater than the increase in manufactures. It was somewhat less than the increase in mining, but it must be remembered that the largest elements in mining are the energy materials coal and oil, while the energy index itself is held down by the inclusion of the vanishing horse. Finally the increase in energy was somewhat less than that in transportation.

The broad relationships are unmistakable. A great increase in per capita production is made possible by a still greater increase in power, and along with the process goes an increase in transportation which is the greatest of all consumers of power.

7. POWER DEVELOPMENTS IN THE UNITED STATES[10]

It is manifestly impossible, or at least impracticable, to make a census of our machines. They change and become obsolete too rapidly, and they can not be reduced to any satisfactory common unit. But there is one way whereby an *index* of the installation of machinery may be obtained—by ascertaining the total horsepower of the engines that drive the different kinds of machinery.

The technical side of a discussion on horsepower equipment may be divided into two parts—generation of power and transmission of power. The first deals with the making of kinetic energy out of the potential energy of natural resources such as coal, oil, and water. The second deals with devices that connect this energy of motion to machines which do man's work. The story of each of these phases falls

[10] Adapted from C. R. Daugherty, *The Development of Horsepower Equipment in the United States*, pp. 13–112. (Washington, D.C.: Department of the Interior, U.S. Government Printing Office, 1928.)

roughly into three periods—the colonial period, lasting till 1790; the period from 1790 to 1860; the period from 1860 to the present time.

I. During the colonial period the industrial situation in this country was similar to that existing in England before the industrial revolution. The manufacturer was a man who owned a small mill or operated a forge, and in colonial parlance a mill meant either a grinding contrivance or any machinery operated by hand, animal, wind, or water. These were the chief types of power in use at that time, and they came to be employed in the order named. Hand power was first used everywhere in forges and for grinding. The utilization of animal power came next, horses and cattle being used where absence of water power, pecuniary inability, or sparseness of population made it impracticable to use power of any other type. Wind was used to turn the wheels of gristmills and sawmills at an early date. Windmills were found chiefly among the Dutch settlers in New York, although there were a considerable number in New England. Indeed, the first mill to be operated in that section of the country was one propelled by wind near Watertown, Mass., in 1632. Most of the small colonial establishments, however, were operated by water power. Power transmission was so little understood that a separate wheel was generally necessary for each unit of machinery. The wheels and most of the mechanism were of wood. The invention of improvements by which several kinds of apparatus—threshing and winnowing machines, grist and bolting mills, flax beating and cleaning machinery—could be operated by a single wheel is attributed to a Connecticut mechanic [Joel Harvey], who not long before the Revolution received a prize from the London Society of Arts for his devices. Any part of the machinery could be discontinued without impeding the rest.

The steam engine was of no importance as a prime mover in colonial manufactures. It had only just been proved practicable and was yet in the experimental stage. Watt's engine was patented in 1769, but it did not become a really established factor in the economic life of Great Britain until the colonies had won their freedom.

II. In the second period, however, up to the Civil War, the factory system of manufacture began to develop, and a number of improvements were effected. At first the very fact that water power was so plentiful and inexpensive led to wastefulness in its use. Managers

of enterprises chose to employ cheap water wheels rather than invest in more expensive ones which by their more economical utilization of water would have amply justified the extra cost. Until 1840, for example, wooden pitchback wheels were used which turned inward toward the fall, the water striking them just short of their highest point, the impact or kinetic energy of the falling water being thus lost.

It is believed that the introduction of the first steam-engine mill at Providence, R.I., in 1830 stimulated the search for a more efficient way to utilize water power. Interest turned to the hydraulic turbine. This prime mover had reached its greatest perfection in France. It had been tried in this country in 1790, but the experiment was a failure. Soon after 1840 the Franklin Institute of Philadelphia published accounts of the French wheels which led to experimentation and resulting proof of their greater efficiency and cheapness. There is some difference of opinion as to when the hydraulic turbine was first used in this country, but it is safe to say that by 1845 there were two or three in successful operation. The introduction of the turbine was the first step toward the modern hydraulic plant.

Steam engines, to the introduction of which was partly due the marked improvement in the economical utilization of water power, were installed slowly at first. During the first third of the nineteenth century the location of factories was determined chiefly with reference to water power. But improvements in the steam engine led to their increasing use during the later half of this period.

Two general designs of engine came into early use—the low-pressure Boulton and Watt type, imported from England and also built in America, and the high-pressure type, made by Oliver Evans in Philadelphia, which was able to compete actively with the low-pressure engine and which was in some respects superior. The high-pressure engine was more satisfactory for use in factories, and, although it required more fuel, was simpler to build.

The invention of the crank shaft by Watt in 1784 changed the reciprocating motion of the engine piston to the rotary motion of a shaft, and the use of all the expanding power of steam in triple-expansion engines is another outstanding improvement in this period. But perhaps the greatest advance, so far as factory use is concerned, was that made in the new Corliss engine of 1849. This engine possessed a

much more sensitive governor, called variously a "valve gear" or "rotary valve" or "drop cut-off," which enabled engineers not only to keep the speed of the engine much more uniform than before but to regulate the speed in accordance with the requirements of the particular factory. Spindles and looms, for example, could be driven continuously at the speed required for the best type of product. In addition to affording evenness of operation, the Corliss engine permitted appreciable economies in fuel utilization.

The third chief type of prime mover, the internal-combustion engine, was not developed to practical use during the period before the Civil War, but a great deal of experimentation was being done with the idea of moving a piston by means of expanding gases. In fact, ever since 1678, when the Abbé de Hautefeuille used an explosion of gunpowder to drive a piston in a cylinder, men had been working on the problem.

In considering the progress made during this period, it must be remembered that the difficulty of working metal to exact dimensions retarded the development of prime movers. In the early steam engines, for example, the lever beams, the arms and shafts of the fly wheels, the bearings, and even the boilers and other parts were made of wood. Advances in engine design depended in part on improvements in iron working.

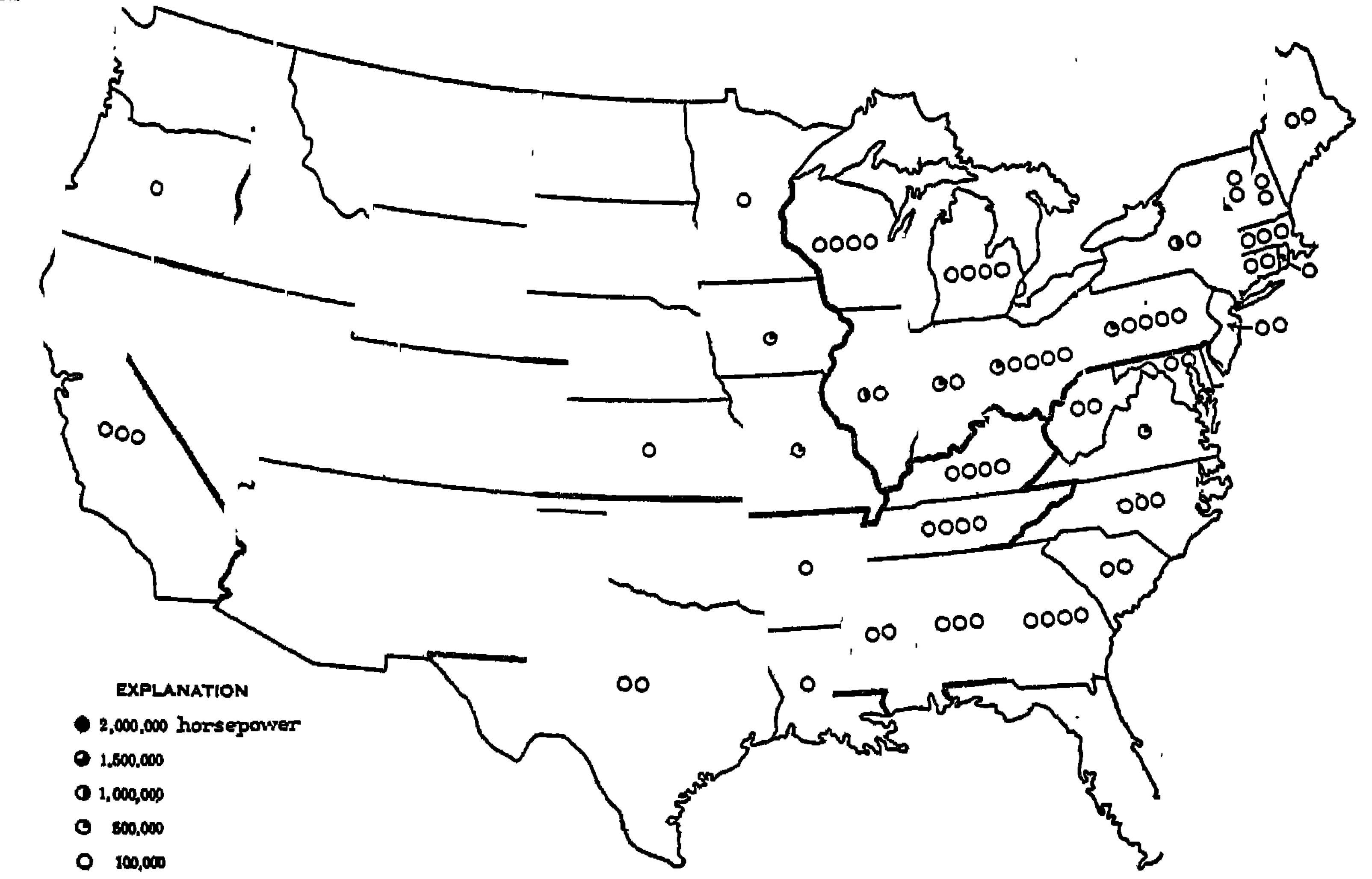
III. It is since 1860 that the most rapid strides have been made in power development. Technical advances in subsidiary industries and new demands for power made by the growing industrialism of the country have furnished ample impetus.

One outstanding invention has appeared in the field of water power. This was the Pelton wheel, first used successfully in 1884 at the Chollar mine, in the Sierra Nevada.

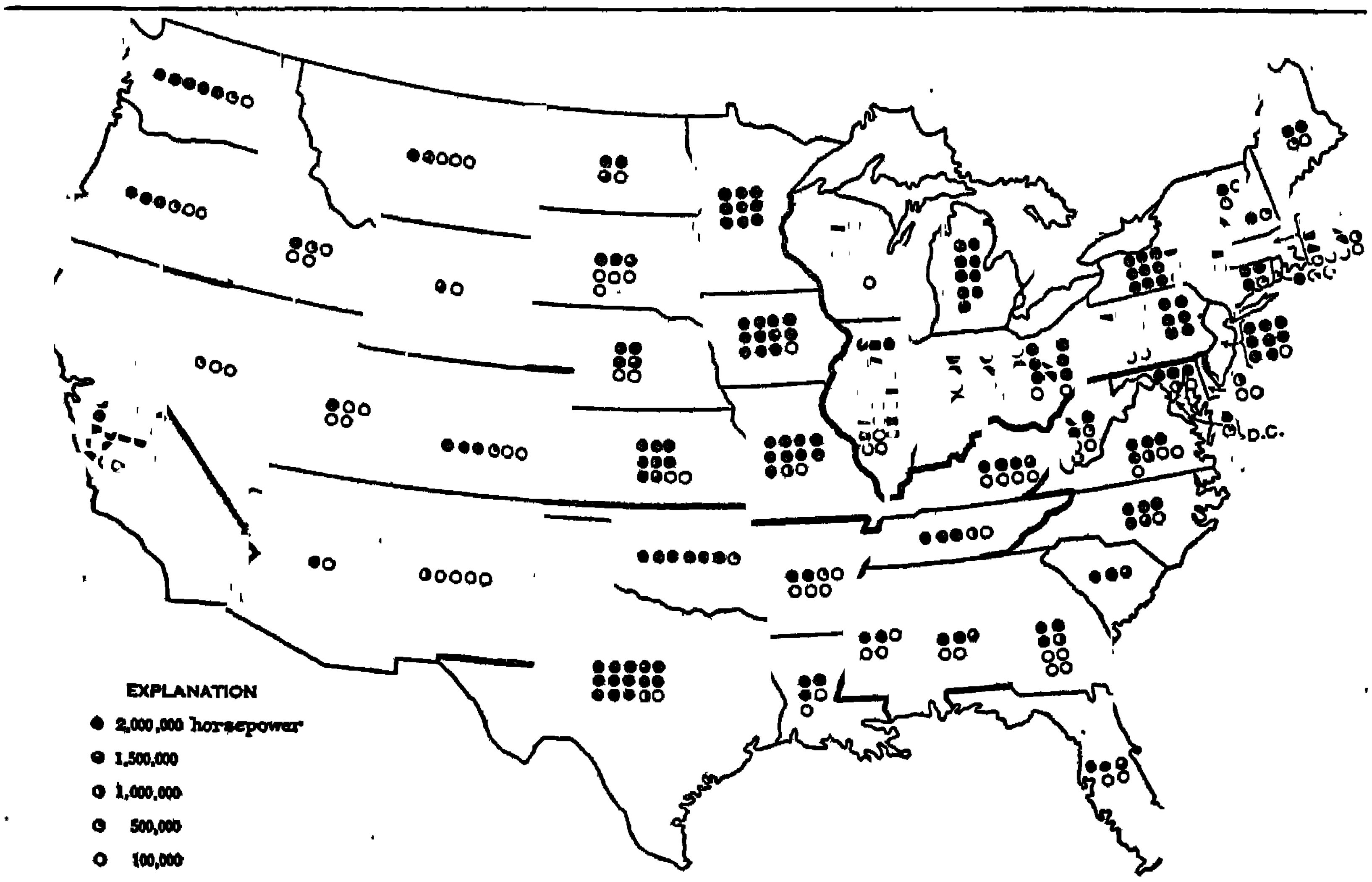
The steam turbine was the major development in steam utilization during the later half of the nineteenth century. Engineers had experimented with the idea ever since Hero, of Egypt, had made his crude toy about 100 B. C., but it had never been of practical use because of its high speed. Not until the high-speed electric generator was invented did it find extensive employment.

An extremely interesting development of recent date is the use of mercury vapor instead of steam to operate turbines. Mercury is va-

porized in a specially constructed boiler, passes through a turbine, where it does useful work, and exhausts into a surface condenser, where its latent heat is used to make steam that drives an ordinary

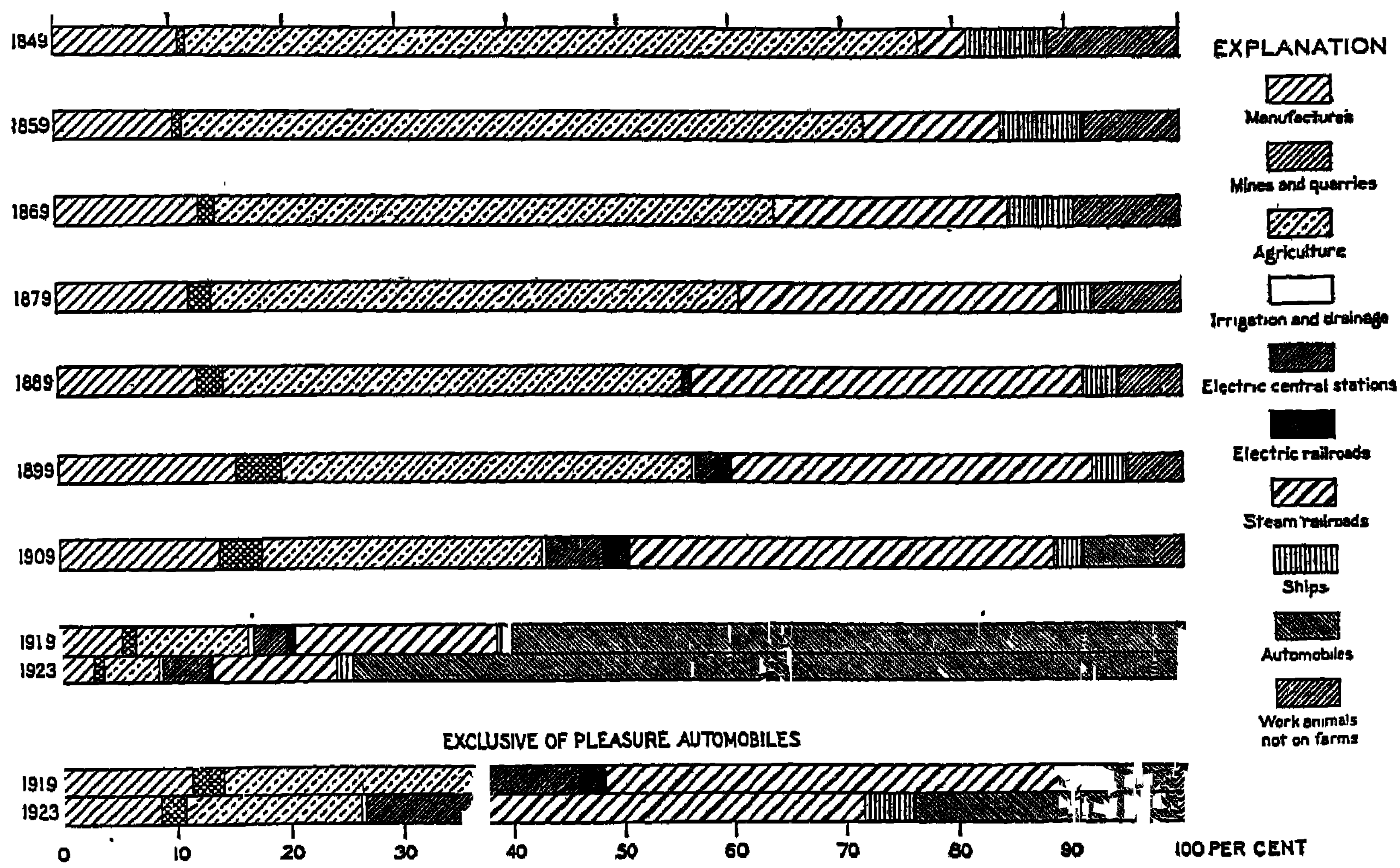


Total Horse-Power of Prime Movers, 1869



Total Horse-Power of Prime Movers, 1923

turbine. The condensed mercury is returned to the boiler and used again. The advantage of this system is due to the facts that mercury can be heated to a high temperature without developing excessive pressure and that the heat of condensation can be utilized for making steam at pressure desirable for use. The utmost care, however, must be exercised to prevent the escape of the highly poisonous mercury vapor. A system of this type was installed in 1923 by the Hartford (Conn.) Electric Light & Power Co. It is reported that the experi-

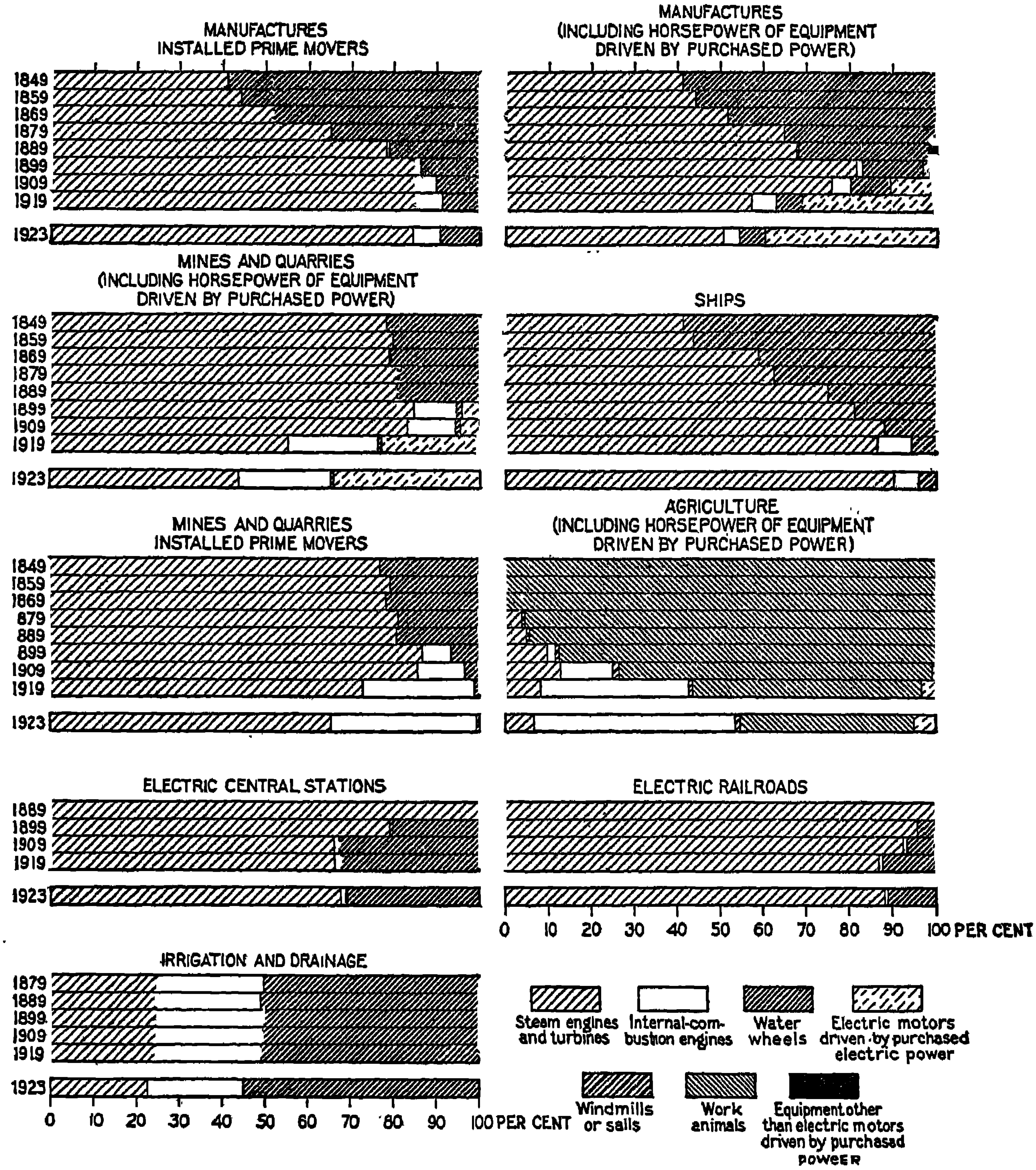


Horse-Power of Prime Movers Installed in Different Activities, 1849–1923

ment has proved highly successful and that the fuel bill has been about halved.

The internal-combustion engine was developed about the time of the Civil War. The Lenoir motor, which marked a distinct epoch in gas-engine construction, appeared in 1860 and was the first engine of this type that performed with relative smoothness and efficiency; but it used fuel rather wastefully. The Lenoir engine was followed in 1862 by an engine invented by Beau de Rochas, who introduced the modern system of four-cycle operation. This engine was placed on the market in 1878 by Otto, after whom the four-cycle idea is sometimes named. In 1879 Clerk brought out his two-cycle engine. Both these types are used to-day, but the four-cycle engine is the prevailing type.

Many small improvements have been effected in these engines, but there has been only one notable and significant development in the internal-combustion field since 1880—the Diesel engine, which uti-

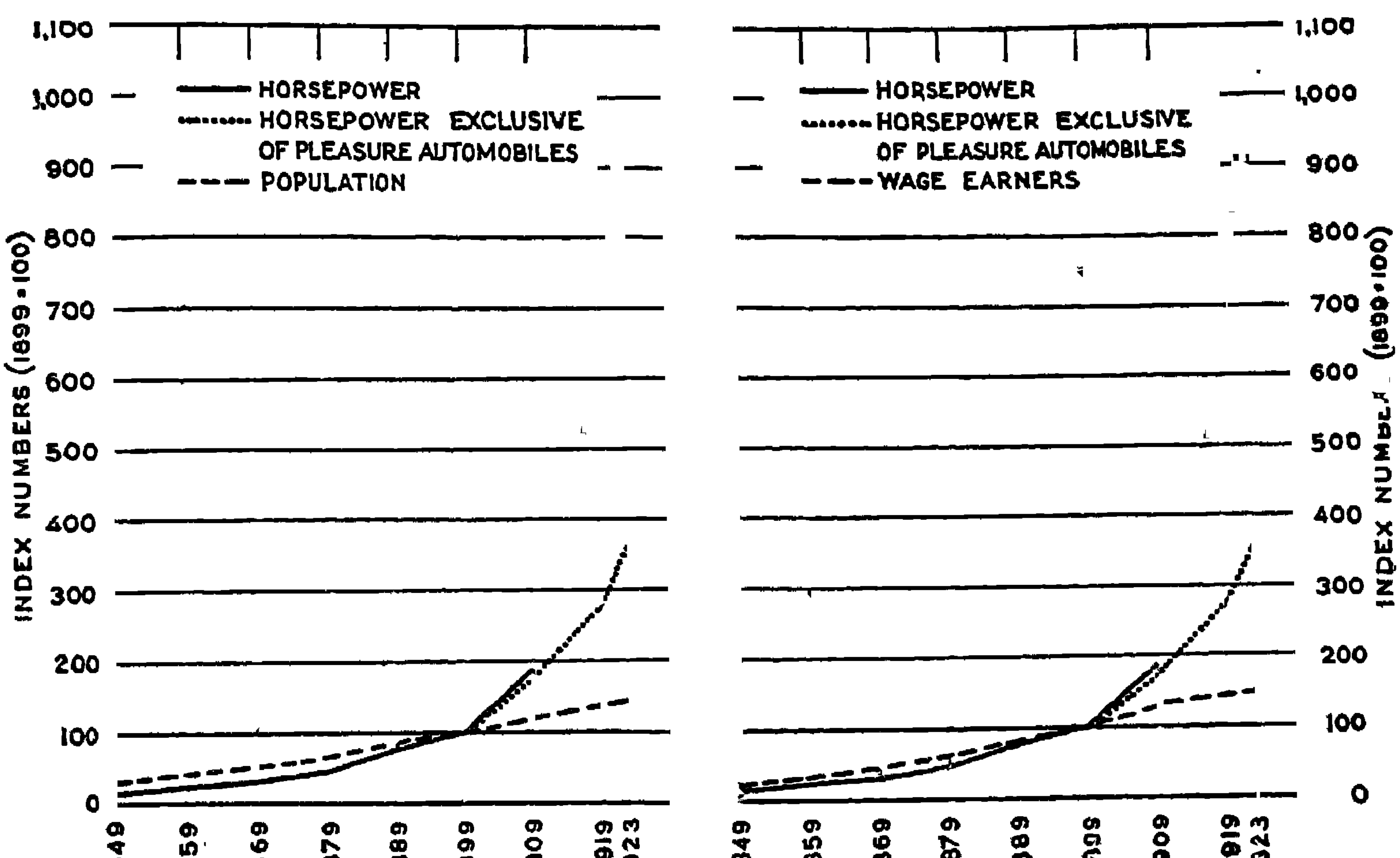


Horse-Power of Prime Movers Installed and Utilized in Different Activities, 1849–1923, by Types of Prime Movers

lizes the four-cycle principle. The chief difference of the Diesel from other internal-combustion engines is that instead of an electric spark being used to ignite a charge of fuel vapor, injected air is so greatly compressed in the cylinder that its heat fires the fuel, which is injected into the cylinder at the completion of compression. Great economies

are claimed for the Diesel motor, one of which is that heavy oils may be used to advantage.

The chief use of the internal-combustion engine has been in the province of transportation, where its advantages are obvious. It has failed to advance as a source of electric generation, mainly because to build it in the large units required in central stations has been impossible. Diesel engines, however, are gradually being increased in size and are successfully competing with steam-driven prime movers.



Horse-Power of Prime Movers, Population, and Wage-Earners in the United States, 1849–1923

Remarkable as has been the growth in the total capacity of this kind of prime mover and supreme as it is in its own field, another equally outstanding power achievement since 1860 has been the development of electricity. In many ways electricity is unsurpassed as a form of power. The electric generator and the electric motor are, of course, not prime movers, but the current produced by one and used by the other has enabled this country to use sources of power which otherwise would be largely untouched and to put this energy at the disposal of almost every inhabitant.

The first electric central station in the United States was the one built by Edison at New York City in 1882. The current in this and all

the other early plants was used for lighting. Industrial uses were to come later. The first hydroelectric station began operation in the same year at Appleton, Wis. In 1885, at Great Barrington, Mass., a notable advance was made in the first successful commercial use of alternating current for lighting. The year 1887 saw the first electric street railway in this country in operation at Richmond, Va.

Most of the developments in the field of electricity, however, have been made in connection with transmission. These improvements have paved the way for what some choose to call "the second industrial revolution" and have made possible the location of factories at comparatively long distances from the sources of power. The transformer idea was contributed by Faraday about 1845, but it was of no practical use until 1888, when Tesla invented both the multiple transformer and the polyphase electric motor for alternating current of high frequency.

As regards the total horsepower of prime movers installed in the different industrial activities in this country for each census year from 1849 to 1923, from 10 millions it has grown to the astonishing total of 684 millions of horsepower, more than sixty-eight times as much. Each decade has witnessed a steady increase, but since 1899 the development has been marvelous. Before that time the increase in any 20-year period had never been much more than twofold, but in the 20 years from 1899 to 1919 the growth was more than sixfold. Only four years later, in 1923, the total was over ten times that for 1899. The chief reason for this recent enormous growth is the increasingly extensive use of the internal-combustion engine in the pleasure automobile. Over 450 million horsepower, or almost two-thirds of the 1923 total, belongs to this class.

It is at once apparent that there has been a remarkable increase in motor-driven vehicles. The next largest increase in capacity of prime movers is in electric central stations, which show a gain from 120,000 horsepower in 1899 to 22,000,000 in 1923. Second in rank in total capacity to automobiles come steam locomotives, indicating the importance of railroad transportation.

Agriculture ranks third in capacity of prime movers. Up to 1869 and later more than half of the total capacity of prime movers in all activities was installed and utilized in agriculture. The vast industrial

development in the United States that was well under way at the beginning of the century called for so much power that prime movers in agriculture gradually became of relatively less importance in each decade, but nevertheless the capacity of prime movers in agriculture still holds third place.

TABLE I

TOTAL HORSEPOWER OF PRIME MOVERS IN THE UNITED STATES, 1849–1923

TOTAL

Year	Horsepower	Index No. (1899 = 100)
1849	10,066,000	16
1859	15,793,000	25
1869	19,147,000	30
1879	28,820,000	45
1889	47,697,000	74
1899	64,193,000	100
1909	120,331,000	187
1919	396,118,000	617
1923	684,044,000	1,066
EXCLUSIVE OF PLEASURE AUTOMOBILES		
1899	64,161,000	100
1909	112,873,000	176
1919	176,650,000	275
1923	230,514,000	359

In general, transportation activities have increased more rapidly than the activities that produce "form utilities"—manufactures, mines and quarries, and agriculture.

A second manner of analysis concerns itself with the growth of horsepower equipment among the different types of prime movers. It is evident that the most rapid development has taken place in internal-combustion engines. Steam power, which is still the country's greatest single prime mover, has developed steadily but not so rapidly as water power. Undoubtedly hydroelectic developments have caused the rapid rate of growth since 1899. Windmills have never been of much importance, although their use has gradually increased.

Several main points of interest come to light in the percentage distribution of prime movers in each of the fields of activity. The in-

TABLE II

Horsepower of Prime Movers Installed in Different Activities, 1849–1923

Year	Manufactures	Mines and Quarries	Agriculture	Irrigation and Drainage	Electric Central Stations	Electric Railroads	Steam Railroads	Ships	Automobiles	Work Animals Not On Farms	Total
HORSEPOWER (THOUSANDS)											
1849	1,100	50	6,597	......	......	......	435	734	....	1,150	10,066
1859	1,600	150	9,655	......	......	......	1,940	1,142	....	1,306	15,793
1869	2,346	350	9,588	......	......	......	4,100	1,076	....	1,687	19,147
1879	3,411	650	13,764	5	......	......	7,720	1,110	....	2,160	28,820
1889	5,850	1,300	19,835	33	120	140	16,300	1,444	....	2,675	47,697
1899	9,778	2,754	23,519	120	1,200	935	20,900	1,900	32	3,055	64,193
1909	16,803	4,403	30,807	361	5,225	3,091	45,400	3,122	7,714	3,405	120,331
1919	20,063	5,112	39,222	816	15,250	4,360	72,300	6,584	230,432	1,979	396,118
1923	19,728	5,000	38,100	1,300	22,000	4,100	74,600	10,262	507,254	1,700	684,044
HORSEPOWER, EXCLUSIVE OF PLEASURE AUTOMOBILES (THOUSANDS)											
1899	9,778	2,754	23,519	120	1,200	935	20,900	1,900	0	3,055	64,161
1909	16,803	4,403	30,807	361	5,225	3,091	45,400	3,122	256	3,405	112,873
1919	20,063	5,112	39,222	816	15,250	4,360	72,300	6,584	10,964	1,979	176,650
1923	19,728	5,000	38,100	1,300	22,000	4,100	74,600	10,262	53,724	1,700	230,514
PERCENTAGE OF EACH YEAR'S TOTAL											
1849	10.90	0.50	65.52	......	......	......	4.30	7.30	....	11.48	100.00
1859	10.12	.94	61.18	......	......	......	12.26	7.24	....	8.26	100.00
1869	12.24	1.83	50.03	......	......	......	21.37	5.72	....	8.81	100.00
1879	11.82	2.26	47.77	0.02	......	......	26.81	3.86	....	7.46	100.00
1889	12.24	2.73	41.60	.07	0.25	0.29	34.19	3.03	....	5.60	100.00
1899	15.23	4.28	36.63	.19	1.87	1.46	32.57	2.96	0.05	4.76	100.00
1909	13.98	3.66	25.62	.30	4.33	2.57	37.73	2.59	6.41	2.83	100.00
1919	5.05	1.29	9.90	.21	3.85	1.10	18.25	1.66	58.20	.49	100.00
1923	2.89	.73	5.57	.19	3.22	.60	10.91	1.50	74.14	.25	100.00
PERCENTAGE, EXCLUSIVE OF PLEASURE AUTOMOBILES											
1899	15.24	4.29	36.66	0.19	1.87	1.46	32.57	2.96	0	4.76	100.00
1909	14.89	3.90	27.29	.32	4.63	2.73	40.22	2.77	.23	3.02	100.00
1919	11.32	2.88	22.23	.46	8.63	2.47	40.92	3.76	6.21	1.12	100.00
1923	8.57	2.17	16.51	.57	9.55	1.78	32.34	4.46	23.31	.74	100.00
INDEX NUMBERS (1899=100)											
1849	11	2	28	......	......	......	2	39	....	38	16
1859	16	5	41	......	......	......	9	60	....	43	25
1869	24	13	41	......	......	......	20	57	....	55	30
1879	36	24	59	4	......	......	37	58	....	71	45
1889	60	47	84	28	10	15	78	76	....	88	74
1899	100	100	100	100	100	100	100	100	100	100	100
1909	172	160	131	301	435	330	217	164	24,106	111	187
1919	205	186	167	680	1,271	466	346	347	720,100	65	617
1923	202	182	162	1,083	1,832	438	357	540	1,585,169	56	1,065
INDEX NUMBERS, EXCLUSIVE OF PLEASURE AUTOBOMILES											
1899	......	......	......	......	......	......	......	......	......	....	100
1909	......	......	......	......	......	......	......	......	100	....	176
1919	......	......	......	......	......	......	......	......	4,283	....	275
1923	......	......	......	......	......	......	......	......	20,986	....	359

creasing use of purchased electricity in manufactures and in mines and quarries is worthy of note. In agriculture work animals are still almost of first importance, being topped in 1923 only by internal-combustion equipment. Steam and purchased electricity are little used in agriculture, because they involve stationary power units, and most of the work on farms requires tractive force. Steam-driven prime movers form the chief type in electric central stations and electric-railroad power plants, although in the central stations water wheels amount to almost one-third of the total. The sailing vessel has been supplanted by the steam-driven ship ever since the Civil War. The use of internal-combustion engines for driving ships is increasing, and the horsepower of Diesel engines used to operate ships may reach a considerable figure, especially if there is no pronounced increase in the cost of fuel oil.

It is a striking fact that for more than 15 years so much more equipment has been installed for moving persons and goods from place to place than for making things. In so far as this difference is caused by equipment used for carrying the products of manufactures, mines and quarries, and agriculture, the conclusion that geographic specialization of production has gone far in this country is verified. And in so far as it is the result of equipment used for transporting persons, it may be cited as evidence supporting the conclusion that the citizens of this nation are enjoying unprecedented wealth and leisure, as shown especially by the figures for pleasure automobiles. Both conclusions are justified. It is interesting to speculate as to whether or not this immense amount of transportation equipment will not work toward a relocation of manufacturing industries with respect to markets and raw materials.

The purpose of this study is primarily to set forth the trends manifested in horsepower equipment, but in conclusion it may not be out of place to suggest a number of ways in which the power index may be employed. They may be enumerated as follows:

1. As a measure of general industrial growth.

2. As a measure of capital accumulation.

3. As a measure of mechanical development, by comparing the index of power equipment with indices or measures of (*a*) the supply of labor (or number of wage earners); (*b*) the volume of production; (*c*) the volume of production per

TABLE III

Horsepower of Prime Movers, 1849–1923, by Types of Prime Movers

TOTAL

Year	A. Horsepower (Thousands): Steam Engines and Turbines	Internal Combustion Engines	Water Wheels	Windmills	Work Animals	Total	B. Percentage of Each Year's Total: Steam Engines and Turbines	Internal Combustion Engines	Water Wheels	Windmills	Work Animals	C. Index Numbers (1899=100): Steam Engines and Turbines	Internal Combustion Engines	Water Wheels	Windmills	Work Animals
1849...	1,228	....	662	429	7,747	10,066	12.19	....	6.58	4.26	76.97	3	......	36	65	35
1859...	3,263	....	930	639	10,961	15,793	20.66	....	5.88	4.05	69.41	8	....	50	97	49
1869...	6,215	....	1,205	452	11,275	19,147	32.51	....	6.21	2.36	58.92	16	....	65	69	50
1879 ..	11,636	....	1,353	507	15,324	28,820	40.38	....	4.69	1.76	53.17	30	....	73	77	69
1889...	24,281	17	1,522	566	21,311	47,697	50.89	0.03	3.20	1.19	44.69	63	2	82	86	96
1899...	38,445	956	1,860	658	22,274	64,193	59.84	1.49	2.90	1.02	34.75	100	100	100	100	100
1909...	77,055	13,170	4,022	822	25,262	120,331	63.99	10.94	3.34	.68	21.05	200	1,378	216	125	113
1919...	116,380	247,031	7,650	836	24,221	396,118	29.43	62.32	1.92	.21	6.13	303	25,840	411	127	109
1923...	125,773	526,322	9,598	851	21,500	684,044	18.33	77.00	1.41	.12	3.14	327	55,055	516	129	97

EXCLUSIVE OF PLEASURE AUTOMOBILES

Year	Steam Engines and Turbines	Internal Combustion Engines	Water Wheels	Windmills	Work Animals	Total	Steam Engines and Turbines	Internal Combustion Engines	Water Wheels	Windmills	Work Animals	Steam Engines and Turbines	Internal Combustion Engines	Water Wheels	Windmills	Work Animals
1899...	38,445	924	1,860	658	22,274	64,161	59.87	1.44	2.90	1.02	34.77	100	100	100	100	100
1909...	77,055	5,712	4,022	822	25,262	112,873	68.26	5.07	3.57	.73	22.37	200	618	216	125	113
1919...	116,380	27,563	7,650	836	24,221	176,650	66.00	15.56	4.33	.47	13.64	303	2,983	411	127	109
1923...	125,773	72,792	9,598	851	21,500	230,514	54.57	31.57	4.16	.37	9.33	327	7,878	516	129	97

wage earner; (*d*) the area of agricultural land in use; (*e*) the amount of wages per wage earner; (*f*) the capital invested per wage earner.

4. As a means of comparing these items for the United States as a whole with those for other countries and with those for individual States or districts of this country.

Three of these uses have been developed in the preceding pages. Frequent reference has been made to the one which heads the list. The same is true for the second one, if "capital" is taken to mean instruments of production, particularly machinery. It is recognized, of course, that the power index tells nothing about the degree of intricacy or the value of the machines and their products. For example, a dentist's machine uses much less power in relation to the value of the machine than a textile-weaving machine. The growth in power equipment has also been compared with the growth in population and in number of wage earners and found to have advanced much more rapidly—in other words, the amount of horsepower per wage earner has shown a steady and decided rise since 1849.

The increase in equipment may also be compared with the increase in volume of production. This is perhaps the chief use of the power index and certainly its chief claim to interest in the minds of contemporary business men and economists. If the volume of output has grown faster than the number of wage earners, the inference safely follows that production per wage earner has increased throughout the period. And if, at the same time, the amount of power equipment has increased, it may be assumed that this item, so closely associated with human labor in production, has been at least partly responsible for the increase in output. A still better way of getting at this correlation is to compare directly the growth in power per wage earner with growth in volume of production per wage earner. If both have increased together, it is safe to assume that a correlation exists—that the growth in power is to be largely credited with the growth in production.

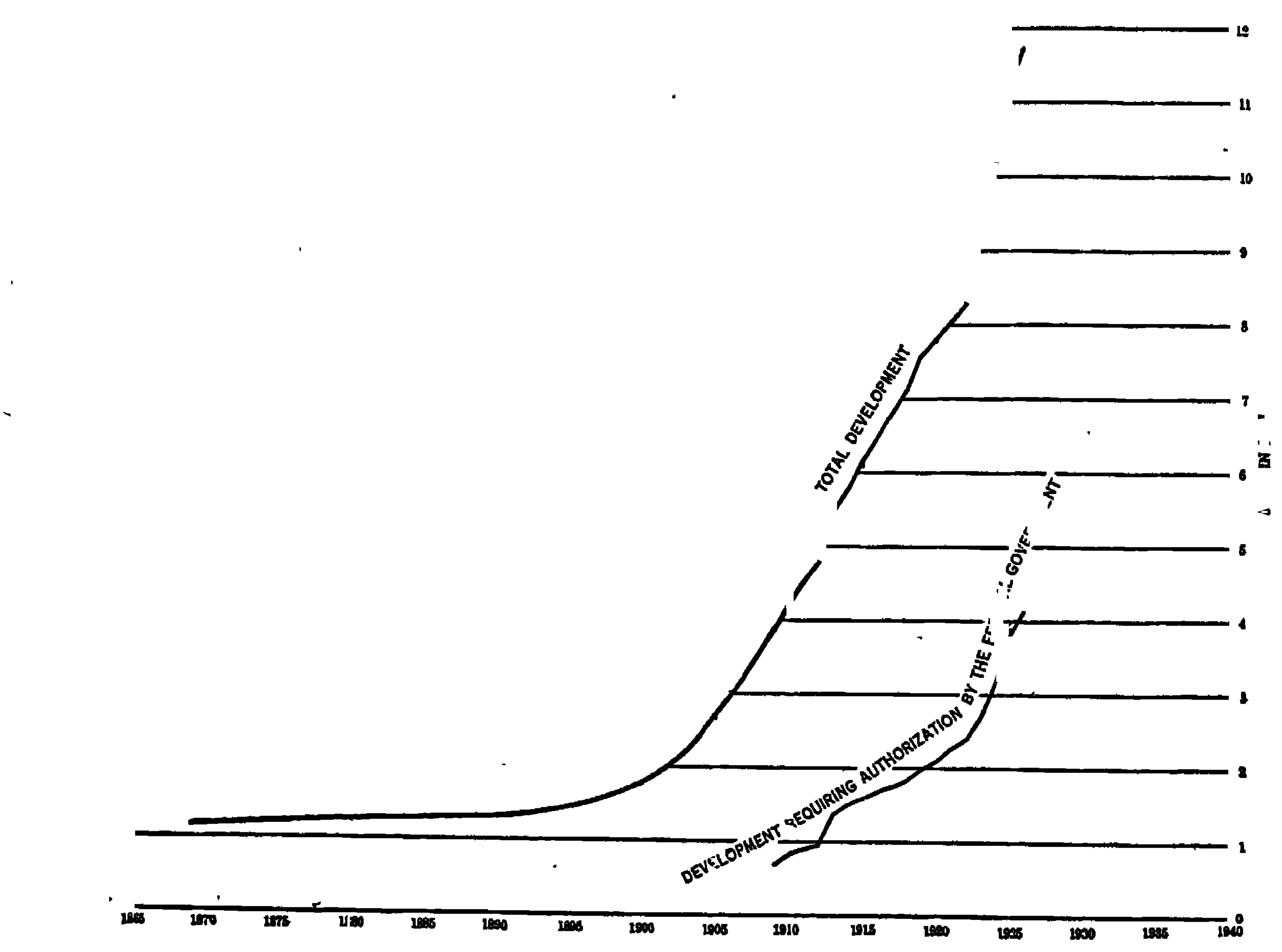
It is realized that other elements may also enter into the matter of increased output. The wider employment of approved management methods, the campaign against waste, improved organization, and better industrial relations have all undoubtedly helped to effect the

general result. But these elements were used in conjunction with more and better mechanical equipment.

See also "The World's Power Resources," page 329.

8. THE WATER-POWER SITUATION[11]

Notable activity in water-power development commenced in the nineties, when electric transmission of power became feasible and the hydroelectric plant became a factor in the generation of power, and

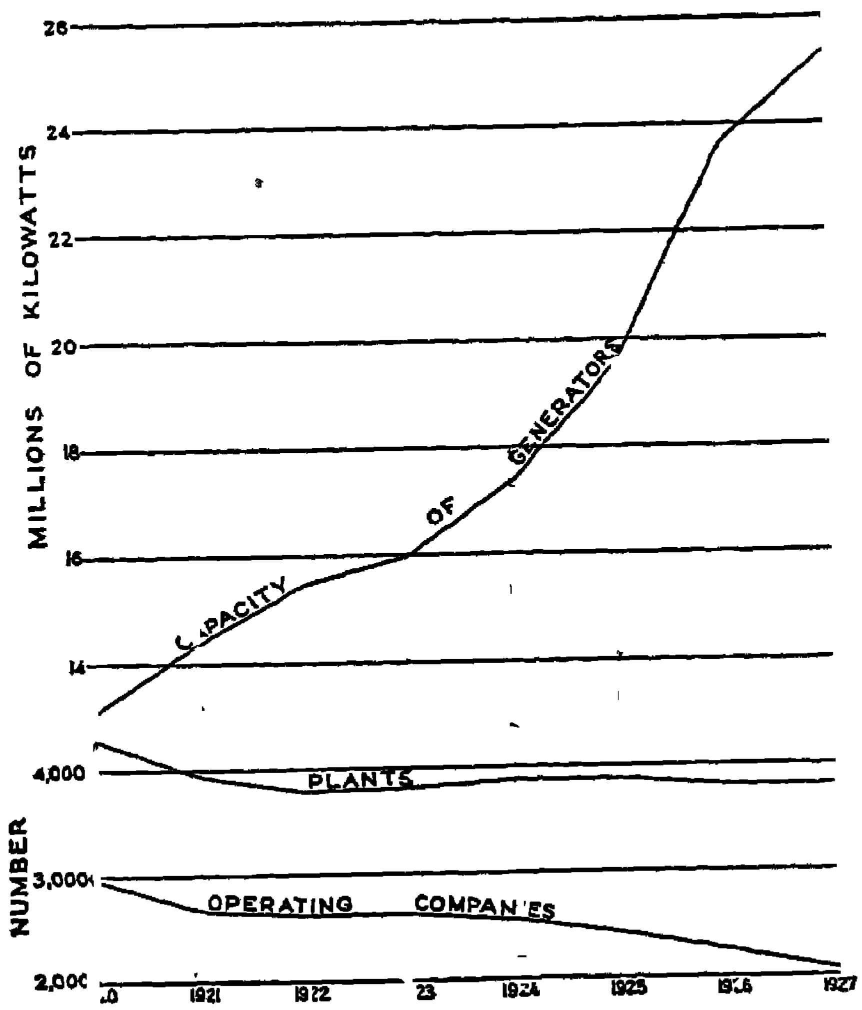


GROWTH OF WATER-POWER DEVELOPMENT IN THE UNITED STATES

up to 1910 the rate of growth gradually increased. The annual growth from 1910 to 1923 was reasonably uniform except possibly in the years 1913 and 1919. The somewhat abnormally large development in 1913 is explained in part by the fact that it includes large installa-

[11] Adapted from R. W. Davenport, *Growth of Water-Power Development in the United States,* pp. 206–7. (Washington, D.C.: Department of the Interior, U.S. Government Printing Office, 1928.)

tions on Mississippi River at Keokuk, Iowa, and on Big Creek, Calif. Similarly, the result for 1919 is explained in part by a large additional installation at Niagara Falls. The great increase in development beginning with 1923 may be accounted for by several factors, the more influential of which are the increasing demand for power, the reaction from retarded growth during the war period, the stabilization of construction costs after the war, and, in 1920, the passage of the Federal water-power act, which afforded a more satisfactory basis for the development of projects requiring Federal authorization. Steady growth in water-power development appears to be assured for many years.



Electric Public-Utility Power Companies, 1920–26

The figures[12] of potential water power cannot be considered final, as future surveys and investigations will probably indicate additional feasible water-power sites and may also indicate changes in the potential power of present known sites. The development of storage reservoirs will also affect the estimates of power available. It is believed, however, that there will be no radical change in these estimates of potential water power by further surveys or investigations. From an investigation of the capacity of water wheels at fully developed water-power sites in different sections of the country and of the potential power available at the same sites it is estimated that on January 1, 1927, about one-seventh of the total potential power of the United States was developed. As the capacity of water wheels in plants of 100 horsepower or more was 11,721,000 horsepower on January 1, 1927,

[12] Adapted from A. H. Horton, *Developed and Potential Water Power in the United States and Monthly Production of Electricity by Public-Utility Power Plants, 1919–1926*, pp. 117–28. (Washington, D.C.: Department of the Interior, U.S. Government Printing Office, 1928.)

the total capacity of water wheels necessary to develop all the potential water power of the United States would be about 80,000,000 horsepower.

DEVELOPED WATER POWER IN THE UNITED STATES, 1927, AS SHOWN BY CAPACITY OF WATER WHEELS IN PLANTS OF 100 HORSEPOWER OR MORE

Division and State	Total		Public Utility and Municipal		Manufacturing and Miscellaneous	
	Number of Plants	Capacity in Horsepower	Number of Plants	Capacity in Horsepower	Number of Plants	Capacity in Horsepower
United States....	3,390	11,720,983	1,565	9,961,202	1,825	1,759,789
New England........	1,221	1,535,468	264	779,449	957	756,010
Middle Atlantic......	613	2,055,853	239	1,757,413	374	298,441
East North Central...	369	1,009,915	250	770,424	119	239,491
West North Central...	201	532,894	150	436,450	51	96,444
South Atlantic......	341	1,841,197	161	1,600,339	180	240,858
East South Central...	60	867,638	45	863,681	15	3,957
West South Central...	29	32,333	18	28,828	11	3,505
Mountain...........	245	1,030,224	196	1,010,743	49	19,481
Pacific..............	311	2,815,461	242	2,713,875	69	101,586

POTENTIAL WATER-POWER RESOURCES OF THE UNITED STATES, 1924

Division and State	Available 90 Per Cent of the Time		Available 50 Per Cent of the Time	
	Horsepower	Per Cent	Horsepower	Per Cent
United States........	34,818,000	100.00	55,030,000	100.00
New England...........	998,000	2.87	1,978,000	3.60
Middle Atlantic..........	4,317,000	12.40	5,688,000	10.35
East North Central.......	737,000	2.12	1,391,000	2.53
West North Central.......	871,000	2.50	1,844,000	3.35
South Atlantic...........	2,476,000	7.11	4,464,000	8.11
East South Central.......	1,011,000	2.90	2,004,000	3.64
West South Central.......	434,000	1.25	888,000	1.61
Mountain................	10,736,000	30.83	15,513,000	28.19
Pacific..................	13,238,000	38.02	21,260,000	38.63

B. Some Examples of the Application of the New Technology

It adds to one's appreciation of the place of the power-driven machine (remember it is but a type case of the whole field of modern technology) in our modern economy if it is seen at work in several different activities. The sampling process must again be utilized. Transportation, storage, agriculture, and the printing industry will give us a fair range of samples.

The amazing contribution of modern technology to communication and transportation may be visualized by reflecting upon these facts; for five thousand centuries (up to Neolithic times) man had to depend upon his own powers and the simplest of tools for communication and transportation. His own legs, his own arms for paddling a canoe, the moccasin, fire signals, the drum—such equipment pictures the situation. Neolithic man added the beast of burden and later the wheel, to the list, and then for one hundred centuries little advance occurs. Up to say 1830, modern man had communicating and transporting devices which were but little more effective than those of Neolithic man. In other words, only for one century have we had effective devices in these fields of activity, and only in our own generation have we had such devices as the automobile, the aeroplane, the radio, and television. Five thousand centuries of wretched control of space, one hundred centuries of quite modest control, one century of considerable control, one generation of breath-taking control—the chronology parallels roughly the development of the basic technology.

In storage and warehousing the emphasis is upon the creation of time and place utilities, mainly time utilities. In part, these activities are concerned with carrying goods over from a time of their relative abundance to a time of their relative scarcity—and this means time utility. In part, these activities constitute a sort of supplement to transportation. They provide reservoirs for the accumulation of goods which are to be taken to another place, or they provide reservoirs from which goods are to be distributed—and in either event they are agencies in conferring place utility. It is true that in some warehouses a bit of processing is performed on materials passing through them, as when wheat is cleaned or mixed, nuts are polished, or goods are put into smaller packages. But such creation of form utility is an incidental function rather than the essential function in storage and warehousing.

The storage of non-perishable goods calls mainly for space, good transportation facilities, good protection from deterioration and theft, and responsible care. The storage of perishable goods, however, calls not only for mechanical facilities, but also for technology growing out of chemistry and bacteriology.

What lies back of the storage of perishable goods can be most easily seen by reflecting upon what is involved in the preservation of

foods. In this matter, as in so many other parts of man's economic progress, the simple practices of Neolithic man prevailed until about a century ago. Foods were dried or salted or pickled, and last of all canned—and all was done by rule-of-thumb, with no understanding of the underlying principles involved. Indeed, it was not until Pasteur's monumental work in bacteriology that it was realized that the essential element in food preservation is the prevention of the growth of bacteria, and that this may be accomplished *by sterilization*—whence the giant canning industry and the methods of preservation by the use of chemicals; or *by removing moisture*—whence the rapidly growing activities in dehydration; or *by cold*—whence refrigeration and all the manifold forms of cold storage. It is only in the last generation that man has had really effective control of his perishable foods.

It is one of our purposes to evaluate the place of active capital goods in the modern producing system. These capital goods have had their most striking development in such fields as manufacturing, transportation, communication, and mining. A far less striking development has occurred in such activities as marketing or agriculture. It will, accordingly, contribute to a balanced view of the place of active capital goods in the economic order if we examine how they condition agricultural production. It will be found that they condition agricultural activities in three respects: (1) by the part they play on the farm in agriculture proper; (2) by the part they play in providing contacts between the agriculturalist and the rest of society; and (3) by the part they play in providing supplies and equipment for the farm. The last two of these have already been considered to some extent, either directly or indirectly. As for the first, we are already familiar with the broad outlines of the situation. Up to a hundred years ago the active capital goods of the farmer were Neolithic in character except for the facts—important facts—that they were better in quality and more abundant in quantity. Within the last century all this has been changed; the power-driven machine has invaded farming, and it is a fair prediction that a more extensive mechanization of the farm is still to come.

The story of printing will be found to parallel in a rough way the technological developments in other fields. Although the printing press is almost 500 years old, there has been but one century of con-

siderable quantities of printing and only a generation or two of really abundant printing.

It will be well to read the selections of this section with the following issues[12a] in mind:

1. How trustworthy is the generalization that man has had *abundant* transportation and communication only in the last generation or two?
2. How trustworthy is a similar generalization as to storage and as to printing?
3. Can it be that man is now in the midst of a revolution in agriculture? If so, what are some of the happenings which are foreshadowed?
4. How trustworthy is the generalization that man is living in a new world since about 1880 or 1890? New, in what respects?
5. Should we anticipate for the future an increase or a decrease in man's ability to produce economic goods?

1. POWER AND THE MACHINE IN TRANSPORTATION

A. GENERAL STATEMENT[13]

Reduced to simplest terms, transportation is the carrying of goods, persons, or communications from place to place. It may be distinguished from transmission, which also has an idea of change of place. Transportation is the carrying of a commodity (including human being in that term), while transmission seems to be the transfer of energy.

Not only does transportation facilitate specialization, particularly of the territorial type, but transportation today is itself largely carried on by specialists. This has not always been the case. A few hundred years ago transportation was largely the work of merchants who went about the country selling goods, and carrying them in their own conveyances. In a somewhat similar way, even today there is a great deal of this "mercantile transportation." Retail stores, department stores, manufacturers, farmers, coal yards, milkmen, and numerous other business establishments have their own delivery outfits and transport their own sales. This today is largely true in what we may term the "local transport zone"; but formerly it prevailed everywhere.

[12a] A more detailed statement of issues may be found in *Outlines of the Economic Order*, pp. 101–111. (University of Chicago Press.)

[13] Adapted from a statement prepared by Lewis C. Sorrell.

Not only has transportation largely become the work of specialists, but even within that field specialization is very evident. One noteworthy type of specialization in transport is based upon the kind of a "way" utilized, as *railway, waterway, highway,* and *airways.* Crude petroleum, for example, is pumped through pipes from wells to refineries often hundreds of miles distant; and so pipe-lines are still another instance of specialization. Still another type of specialization is evidenced by the distinction between "carrier agencies" and "non-carrier agencies" of transport. Fundamentally, transportation calls for a way or route, a carrying vehicle, and motive power. Under certain conditions one or more of these may be very primitive. An African porter is at once vehicle and motive power; and the path he picks through the jungle is certainly a very rudimentary way. On the Pacific Coast huge rafts of logs, carrying millions of feet of lumber are towed over the ocean; here the commodity itself forms its own vehicle in connection with the buoyancy of the material transported; the tug is the motive power, and the untracked ocean the way. The railway happens to be an instance where usually (but not always) all three of these factors, way, vehicle, and power, are under one ownership and control. This should not obscure the fact, however, that in the case of many other transportation agencies one specialist may furnish the way, another the vehicle, and still a third a motive power. A canal company may provide the waterway; the owner of the goods may supply a barge; and towing specialist may furnish the tug-boat. In such cases the canal and towing companies are non-carrier agencies of transport.

Although the development of our economic order during the last one hundred and fifty years has witnessed the transfer of the transport function largely to transportation specialists, it must be remembered that much transport still remains with the non-specialist. The case of merchant-carriers was instanced above. Even a better example is the case of government agencies. Many of the transportation instrumentalities today are owned and operated by central, state, local or city governments. These governments can hardly be called transportation specialists, because they have many other activities to perform. Streets, highways, canals, and river improvements are generally the work of governments today; and in some countries steam railways

are owned and operated by governmental authority. No enumeration of transportation agencies would be complete that did not accord to our governments a generous recognition of the part they have played in furnishing transport instruments.

Three further instances of specialization remain to be noted. First comes the distinction between local and long distance transportation. The line of demarcation is not easy to draw. But it is evident that street, subway and elevated railways, motor coach companies and drayage concerns largely confine themselves to the hauling of persons and goods about the city or locality. On the other hand, while steam railways and electric interurban lines do handle some commutation traffic, for the most part they depend upon hauling traffic beyond the city and its surrounding tributary area. Second may be mentioned the distinction between common and private carriers, which is largely a legal one. By common carriers lawyers mean persons (natural or artificial) who hold themselves out to the public to carry goods or persons for hire for any who offer them employment. They are largely specialists in transportation. Private carriers, however, agree to haul goods only for certain persons: they, too, *may* be transportation specialists. Third, the development of transportation has carried with it the growth of certain firms who specialize largely in the sale of transportation services. In a sense they are middlemen between the transportation agents, and the public that employs them.

The following condensed classification of transportation agents may assist in giving a clearer notion of the specialization discussed above.

A. Non-Carrier transport agencies: (i.e., not engaged actually in carrying goods or persons, but furnishing some of the required facilities)
- *a*) Natural agents—waterways, such as rivers, lakes, oceans, with their tides, currents, winds, etc.
- *b*) Canal companies
- *c*) Turnpike companies
- *d*) Bridge companies
- *e*) Wharfingers (furnishing wharves for steamships)
- *f*) Towage companies
- *g*) Governments, federal, state, local, city to the extent that they construct, maintain, and operate canals, roads, streets, bridges, river and harbor improvements, and wharves; also where they own but do not operate railways, steamships

B. Carrier transport agencies
- *a*) Companies of porters
- *b*) Packhorse companies
- *c*) Drayage or carting concerns
- *d*) Motor coach or bus operators
- *e*) Electric interurbans
- *f*) Street, elevated and subways companies
- *g*) Taxicab companies
- *h*) Steam railways
- *i*) Steamship companies
- *j*) Express companies
- *k*) Pipe line companies
- *l*) Ferry companies
- *m*) Aviation companies
- *n*) Governments, federal, state, local or city to the extent they operate railways, steamship lines, ferries
  The post-office belongs to this group
- *o*) Merchant carriers by rail, steamship, or highway

C. Agents for marketing transportation services
- *a*) Freight forwarders
- *b*) Ticket scalpers or brokers
- *c*) Tourist agencies
- *d*) Ship and freight brokers
- *e*) Steamship agencies

See also:
"Technical Requisites for the Transportation of Goods," page 159.
"Travel in the Middle Ages," page 161.
"Carriers and Communicators 1660–1760," page 163.

B. INTERNAL TRANSPORTATION[14]

It may be of interest to glance over a selected list of devices now available that tend to eliminate waste prevalent in handling, transporting, storing and weighing materials, and for rendering quick service in communication of intelligence.

[14] From "Rehabilitation of Existing Plants as a Factor in Production Costs," by Harold V. Coes, in *Engineering Magazine*, (1915), XLIX, 573–74.

Trucks and Cars:
- Automatic trucks
- Mechanical transveyors (hand)
- Mechanical transveyors (power)
- Storage battery or gasoline trucks

Industrial Cars:
- Gasoline operated shifting or switch engines

Cranes and Telphers:
- Traveling bridges and monorail carriages
- Telphers
- Wall cranes
- Jib cranes
- Jib cranes (portable)
- Unloaders (stationary)
- Unloaders (traveling)
- Locomotive cranes (steam)
- Locomotive cranes (electric)

Conveyors:
- Pneumatic
- Belt
- Bucket
- Slat
- Drag chain
- Gravity
- Sectional power
- Unloading
- Piling and tiering
- Interveyors

Weighing devices:
- Direct reading scales
- Track scales
- Automatic scales
- Portable scales
- Belt conveyor integrating scales
- Monorail or telpher section scales
- Crane scales

Hoists:
- Triplex chain
- Electric
- Air
- Steam
- Hydraulic

Elevators:
- Portable
- Hydraulic
- Air
- Steam
- Dumb waiters
- Inclined

Carrier systems:
- Cash carriers
- Tool carriers
- Correspondence carriers
- Books and paper carriers
- Bag carriers

Miscellaneous apparatus:
- Portable revolving elevators
- Movable or traveling platforms
- Interphones
- Autocalls and whistles
- Annunciator systems
- Speaking tube systems, etc.
- Mechanical or moving stairs

C. THE AUTOMOBILE AND GOOD ROADS[15]

With the coming of the automobile, rural highways have assumed a new importance in the transportation facilities of the country. To meet this need roads have been graded and surfaces improved. By 1921, 13 per cent. of the total rural road mileage of the country had

[15] Adapted from "Progress of Rural Highway Construction in the United States," *Commerce Monthly,* VII, No. 5 (September, 1925), 22–23. (The National Bank of Commerce.)

some sort of surface dressing as compared with 7 per cent. in 1904. The proportion now must be considerably larger as since that time resurfacing has been proceeding at the rate of 35,000 to 40,000 miles per year while during the earlier period the average rate was only 13,800 miles.

The magnitude of the whole undertaking is evidenced by the expenditure in recent years of nearly a billion dollars annually for construction, maintenance and all other charges. The expenditure of so large an amount of money is not without effect upon the labor and material markets of the country, while the raising of the funds has contributed to the volume of tax-free bonds absorbed by investors.

The improvement of road surfacing is not a matter of comfort alone to the motorist. It is estimated that the cost of fuel is 40 per cent. greater in driving a car over a dirt road than over a surfaced one and the total increased cost, allowing for wear and tear, is around 25 per cent. While the growing use of automobiles has added greatly to the desire and need for better roads, the relationship has not been entirely one-sided. It may be said with equal truth that the expanding network of hard-surfaced rural roads has contributed to the demand for motor vehicles. In fact, outside of city limits the commercial use of trucks and buses for the transportation of freight and passengers, a phase of motor-car development which has come to have considerable effect upon the short-haul business of railroads and trolley lines, is practically dependent upon durable hard-surfaced roads. The use of trucks by farmers is likewise aided by the improvement of rural roads.

Efforts in the early days of the country's history to establish a national system of roads for communication and transportation were superseded by the development of railroads. Thereafter highway traffic became largely local in character and the roads of the country were laid out chiefly to meet local needs. Moreover, throughout the nineteenth century horse-drawn vehicles were so predominant in traffic that outside of towns and cities the cost of even a gravel surface was usually quite out of proportion to any need that was felt for it.

About thirty years ago, before automobiles had become sufficiently numerous to forecast their importance in the situation, a desire arose in some of the more progressive communities for roads sufficiently well made to give good service the year round, and a start was

made in selecting for improvement some of the most traveled main roads. The rapid growth in number of automobiles has given tremendous impetus to this movement and has brought rural highways back into a position of importance in the national system of transportation and communication.

With the realization that under the new conditions through or trunk routes are of far more than local importance has come gradually a move to take the building and control of such routes out of the hands of local authorities. To this end routes have been selected in nearly all the states and incorporated into state highway systems administered and controlled directly by a state authority with a considerable share of financial contribution from the state.

The national aspect of the road problem has been recognized by the Federal Government, which since 1916 has been taking an active part in highway development by granting financial aid for construction projects. The funds so furnished are and must be used by or under the supervision of a state highway department, thus insuring a unified and responsible administration. Federal control in the use of the funds is secured by the supervision of the construction on each project. Federal aid may not cover more than half the cost of a single project except in states where unappropriated lands amount to more than 5 per cent. of the total area. One-third of the fund available from the Government is apportioned among the states in proportion to their respective areas in relation to the total area of the country, one-third in proportion to the mileage of rural delivery and star routes.

Up to June 30, 1924, the Federal Government had contributed $353,000,000 toward highway construction. That no excessive burden was laid upon the Government in this expenditure is evident, however, from the fact that to the same date Federal receipts from taxes on the sales of motor vehicles and accessories and on passenger cars for hire had totaled $749,000,000.

D. THE MOTOR TRUCK[16]

The motor truck has nearly displaced the horse-drawn vehicle in many types of short distance hauling. For longer distances it competes

[16] Adapted from "The Motor Truck as a Factor in the Transportation System," *Commerce Monthly,* VI, No. 7 (November, 1924), 3–5. (National Bank of Commerce.)

with the railroads to some extent, but its greatest field for usefulness is as a supplement to them. Certain types of traffic can now be handled more satisfactorily by motor truck than in any other manner.

Several factors determine which type of transportation will be most economical in a particular case. Among them are distance to be covered, speed of delivery, quality of service, including regularity and continuity, character of goods transported, condition of the loads, and the availability of railroad service. Where all three types of transportation are available, distance to be covered is perhaps the outstanding factor determining the relative cost of horse, motor or rail transportation. Transportation by water is not taken into consideration here because the conditions are limited under which water transportation and transportation by motor truck may compete.

The greater speed and endurance, and consequent greater radius of activity, of the motor truck have superseded the horse in all excepting some special forms of short-haul transportation. The horse population of the large cities in the United States declined more than 60 per cent. during the ten years from 1910 to 1920. There is still a place for the horse in commercial activities for there are conditions under which horse-drawn delivery wagons are more convenient and economical than motor vehicles, as for instance on milk and ice routes. Many horse-drawn vehicles are also used in city express service.

In rural hauling the greater speed and range of motor trucks have been of particular advantage.

In the opinion of many of the best authorities, the ideal relation of the motor truck to the railway is that one should supplement the other. The motor truck may be applied to the solution of railroad problems in the following ways:

1. As a feeder, either on lines of light traffic, or in territories where the volume of traffic has not heretofore justified the construction of railway branch line feeders.

2. As a substitute for the railroad in short haul or local service, which frequently is an unprofitable service rendered by the railroads and a drain on profits derived from other sources.

3. As a solution of terminal problems, reducing or doing away with the movement of freight by car between stations within the same terminal area, and costly switching operations.

4. The motor bus or the gasoline rail car, literally a modification of the motor bus, may be substituted for the railway passenger train on lines of light passenger traffic.

E. HOW BUSINESS USES AIR TRANSPORTATION[17]

A terse and valuable leaflet summing up the present position of air service to business has been published by the Committee on Aeronautics of the Chamber of Commerce of the United States.

This Committee's survey of a number of banks, insurance companies and business concerns located on air mail and express routes, showed that 96 per cent. utilized the service. The extent of use of air mail and express reported is as follows:

Extensive or daily use by 40 per cent. of concerns reporting; limited or occasional use by 41 per cent. of concerns reporting; extent of use not stated by 15 per cent. of concerns reporting; not used by 4 per cent. of concerns reporting.

As shown in the survey, some of the principal articles sent by air are:

BY BANKS

Checks, drafts and notes for collection and credit, saving interest charges on funds in transit.

Advices of payment of drafts, etc.

Important and rush letters.

Letters to connect with mail to Europe and other foreign destinations.

Shipping documents.

Securities.

BY INSURANCE COMPANIES

Letters, including authorizations, releases, etc.

Applications, policy contracts, and proofs of loss.

Daily reports, card records, monthly accounts and statistical statements.

All policies to distant offices.

Small and urgent supplies to agents.

Checks for claims, policy loans and cash values.

Surety and contract bonds, legal papers, farm mortgages and occasional securities.

Reinsurance claims.

BY BUSINESS HOUSES

Contract and credit letters, documents and sales promotion materials.

Advertising proofs and copy of proof for approval.

[17] Adapted from "How Business Uses Air Transportation," *Executive Service Bulletin*, March, 1929, p. 7. (Metropolitan Life Insurance Company.)

News pictures and photographic mats.
Small packages.
Repair parts.
Announcements of new products.
Rush shipments of samples and "out of stock" merchandise.

2. THE CABLE AND INTERNATIONAL TRADE[18]

Fifty years ago each country, and especially each continent, was in large degree an independent commercial unit. While international trade over great distances was important, it was specialized in character and essential to the business life of only a few countries. Even yet the world has not completely become an economic unit, but it has made notable development in that direction largely as the result of two factors, the introduction of the iron and steel steamship, which greatly increased the size of cargo carriers and made cheap freight rates possible, and the invention of the submarine cable.

Besides the phenomenal increase in volume of business brought about by the extension of telegraphic service across the oceans, this quickened communication also wrought a complete change in business methods, and introduced an element of stability into international trade which it lacked when intercourse depended solely on the mails. Until the cable was available the importer was compelled to place his orders without current quotations either of the market in which he had to buy or of the market in which he proposed to sell. Within the memory of many men still active, every American importer who bought in Europe faced the risk involved in having his orders carried out more than a month after he had received his last information on market conditions abroad. So, too, if a sudden change in conditions here made it advisable to increase or decrease his orders, more than a month elapsed before he could be assured that his instructions had been obeyed. With other parts of the world the time required was even greater. In trade with the Orient, the best part of a year was necessary to complete a single transaction.

The result was apparent in the large margin of profit which was considered necessary. A considerable amount of capital was required, a high rate of turnover was impossible, and prices were necessarily

[18] Adapted from "International Cable Communication," *Commerce Monthly*, II, No. 7 (November, 1920), 3–4. (National Bank of Commerce.)

fixed to afford large profits as an insurance against the equally great losses which lack of market information sometimes made inevitable. It was the day of the clipper ship, indifferent mails, small transactions and relatively large profits. A large part of the foreign business before the advent of the cable was scarcely business, as the term is understood today, but speculation.

Under these conditions, strong import and export houses developed, and it was necessary to give these firms and their agencies the widest latitude in matters involving trading judgment. With the cable, it is now possible for the manufacturer, if he chooses, to export directly, and to keep in as intimate touch with his foreign business as he does with his domestic sales department. Producers who handle their foreign purchases or sales through import and export houses are likewise in so close a contact with transactions that foreign trade need not involve risks or difficulties essentially different from domestic transactions.

This great change is reflected in conditions in the markets for every commodity. These markets today are absolutely international. Wide fluctuations between prices in different markets have been eliminated and the speculative element in foreign trade has thereby been reduced to a minimum.

Notwithstanding the rapid development of radio telegraphy since the first trans-Atlantic signals were transmitted from England to Newfoundland on December 21, 1901, the bulk of international telegraphic business still passes over the cables. The war greatly stimulated the development of the radio, but wireless telegraphy still remains at a disadvantage as compared with the cables. The cable is dependable in its operation and its messages are secret, and, while the high-speed, mechanically operated radio stations are not greatly affected by atmospheric and magnetic conditions, their vibrations are spread broadcast so that a comparatively simple mechanism enables anyone to read them. The radio is in effect a party line, upon which the whole world may listen in.

See also "Concentration in the International Field," page 877.

3. THE EFFECTS OF MACHINERY UPON RURAL LIFE[19]

As long ago as the time of neolithic man, there were tools for working in the soil. There were the digging stick, the hoe, the flint shovel, the spade, the plow, and crude rakes for scratching the soil and making it finer. Slowly, through the centuries, man added to this list and also made his tools of better material—especially after he learned to obtain and use the metals. Nevertheless, down to the early part of the nineteenth century, man's agricultural tools were but little better than those used in Egypt thousands of years ago. Our colonists still used a wooden plow, with an old horseshoe or other bit of scrap iron nailed to the mold board. They still used rude harrows with wooden teeth, or even large branches of trees, to pulverize the soil. The great changes in tools and machines for cultivating the soil have all come about in a little over a hunded years.

In the 1790's Charles Newbold of New Jersey began to work out the idea of a cast-iron plow. His plow was ridiculed by the farmers of the time. They were sure an iron plow would poison the soil! But an iron plow would be so very useful that various persons kept working at the idea. The man who made it really practical was a Quaker named Jethro Wood. He made his plow of separate parts that could be replaced when broken, instead of having it cast all in one piece, like that of Newbold. Between 1830 and 1870 so many improvements were made in the plow that we may say we have had our modern plow since 1870.

Although the plow for turning the soil is the basis of all farming, it would have profited the farmers little if the rest of the work had continued to be done by the old methods. Men could not cultivate large areas, even when plowed, if they had only hoes and rakes or even wooden harrows drawn by oxen. There had to be better harrows and cultivators. Harrows with both body and teeth of iron were introduced, and by 1870, we had the modern toothed harrow with levers that could change the pitch or the slant of the teeth. Later the disk harrow, with disks or sharp wheels that cut up the soil, came into general use.

With all these aids in preparing the soil, there was need of speedier

[19] Adapted from an article by Hazel Kyrk in Marshall, *Readings in the Story of Human Progress*, pp. 77–86. By permission of The Macmillan Company, publishers (1926).

and less laborious methods of planting the seed, and of cultivating the soil around the growing plants. Fortunately, the manufacture of seeders and grain drills began as early as 1840. Successful corn planters were devised ten years later. To-day there are seeders that both plant and cover the grain. There are corn planters that drop the kernels at any intervals desired. There are many kinds of toothed plows or cultivators for working the soil around the plants. Even potato planting and cultivation may now be done by machinery.

For the harvesting of grain the old stone hand sickle (later made of bone or metal) goes back to neolithic times. The metal sickle and its later form, the scythe, continued to be the main harvesting tool until about 1800 when the cradle came into general use. This cradle was a scythe to which wooden fingers had been added for collecting and holding up the grain as it was cut, and placing it in swaths. The cradle enabled one man to do as much as three or four could do with sickles, but, even so, it took a whole day to reap about an acre and a half.

Credit for inventing a machine to reap grain is usually given to Cyrus McCormick. Many inventors, in this country and abroad, had worked on the idea for a generation. But it was McCormick who, in the 1830's and 1840's, proved that the idea was practical and set up a factory to supply our broad farms with modern harvesting machinery. Of course the harvester of to-day, which cuts the grain, ties it into bundles, and dumps these bundles into piles, is a tremendous improvement over McCormick's early machines. His first invention did not accomplish all this.

The threshing machine, too, came into use in this country by 1840. Before this time grain had been threshed with the wooden flail. Using a flail, a man could thresh from eight to sixteen bushels of wheat in one day. To-day the threshing machine cuts, threshes, cleans, sacks, and weighs the grain from our western lands, without human hands ever touching it.

The hay crop of this country is now handled almost entirely by machinery. First came the mowing machine to take the place of the hand scythe. Then other machines took the place of the rake and pitchfork. About the middle of the century there came into use a spring-tooth sulky rake by which a boy and a horse could do the work

of many men in raking the hay into heaps. Hay loaders and hay stackers, with the hay fork and carrier to stow the hay away in the barns, have completed the application of machinery to this branch of farm work.

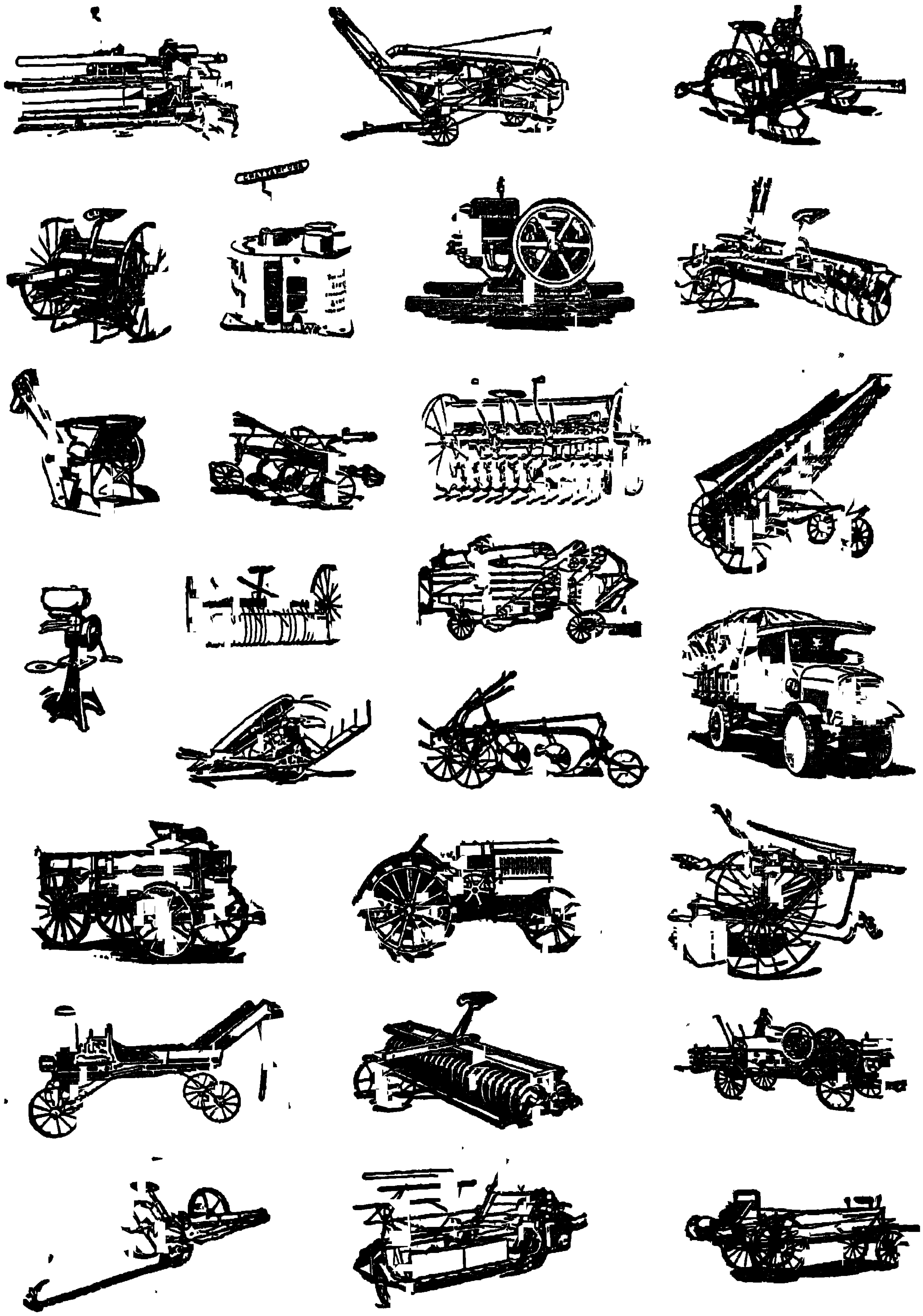
Long after the corn planter and cultivator had come into use, the stalks of corn were still being cut by hand. The old corn knife enabled a man to cut only one or two acres a day, and that with the hardest labor. The corn binder and shocker now cuts and binds from six to ten acres a day with the man sitting still and driving the machine. Formerly the ears were husked by hand with the aid of a husking peg. Now husking machines are in practical use, as well as combined huskers and shredders that husk the ears and shred the stalks into cattle food. There is also a corn sheller that will shell several hundred bushels a day. Farm machinery thus swiftly and easily takes care of the immense crops of corn—an accomplishment which seemed almost miraculous a few decades ago.

There are many other important kinds of farm machinery: potato diggers, hay balers, clover hullers, bean separators, and plant-setting machines of all kinds. The growing of rice, tobacco, cotton, and practically all other crops has been modernized by machinery.

Thus far little has been said about the power used to run this farm machinery. Until comparatively recently the only power aids that the farmer had were wind and animal power. Curious old windmills with great arms carrying sails were introduced from Europe by the early settlers. The modern type of windmill with a wheel instead of sails was developed in this country, and is still widely used. The services that such animals as the horse and ox have rendered man by adding their strength to his feeble efforts in drawing the plow, in carrying and hauling, can scarcely be over-estimated. The new plows, harrows, cultivators, planters, and harvesters were at first all horse-drawn. Gradually, however, steam and the other forms of modern power came into use, and probably the greatest changes in farming in the near future will be an even greater use of steam, gas, or electricity instead of the horse.

The steam engine was early applied to the work of threshing, and presently a steam tractor drew the thresher from farm to farm. Steam has also been applied to plowing on large prairie farms. But the steam

tractor is heavy and expensive, and the gasoline engine promises more for the future. The stationary gasoline engine has been set to work turning the milk separator, the churn, the ensilage cutter, the washing



Courtesy of International Harvester Company

Some Machinery Used in Modern Farming

machine, the sausage grinder, and the grindstone. It pumps water for the stock, for the house, and for irrigation. It saws wood, drills the well, digs post holes, and shells corn. By its power the barn and the orchards are sprayed, and the sheep are sheared. There seems no end to the service it can render the farmer and his wife. Besides the stationary engine and the one that can be mounted on a truck, there are now gasoline tractors. With the tractor the farmer plows, harrows, and plants—one man doing the work of many men and horses. The tractor will also reap and thresh the crop, and a motor truck will haul it to market. The farm is still far from a paradise of ease, but modern machinery has certainly freed the farmer from some of his drudgery. The farmer's task has become more and more one of guiding the horse or the tractor, and operating the machine.

The work of women on the farms has also been greatly lightened by machinery. The care of milk and the making of butter, for example, are not the hard tasks they formerly were. When much milking is to be done, the milking machine is used. A "separator" is installed in the dairy. The skimmed milk is fed to the hogs and calves and the cream is churned by power or sold to a creamery. Washing, canning, and cooking are made easier by labor-saving machinery and utensils. Best of all, the burden of the endless "fetching and carrying" has been greatly lightened by the introduction of new stoves and new fuels, and by the provision of an indoor water supply, which is pumped by a gas engine or a windmill.

Even the machinery used in city factories has lessened the farmer's toil. After great factories were built and began to turn out quantities of cheap goods of all kinds, the farm folk began to buy many things they had formerly made. The farmer ceased to make his tools. The farmers' wives and daughters began to clothe themselves in factory-made ginghams, worsteds, and silks. They bought ready-made garments of all varieties. And these city factories also gave the rural dwellers many new goods. The farmers furnished their parlors with rugs and pianos and victrolas. They set their tables with chinaware and silver; they equipped their kitchens in tin and enamel ware and aluminum. New foods appeared upon the table. The country dwellers came to use literally hundreds of goods they could not obtain until machines and factories made them cheap and plentiful.

The great improvements in communication and transportation have also made farm life very different from what it was. Since 1880 we have begun to be a nation with good roads. Fewer farmers are forced to stay at home several months of the year because the roads are impassable. Railroads are now so numerous that few farms in the central and eastern parts of the country are many miles from a station. The trolley lines also furnish convenient means for traveling and for shipping freight. But living as the American farmer does upon his own farm and not in villages, he would still be somewhat out of touch with his neighbors if it were not for the automobile. With it the farmer conveniently can make calls for business or pleasure throughout the countryside. To-day, too, many rural homes have a telephone, a radio, and daily mail delivery. Times are changed, indeed, since a generation ago, when weeks might pass and the farmer and his family see no faces and hear no voices except their own.

4. MODERN STORAGE

A. GENERAL STATEMENT[20]

Warehousing, originally a function of business carried on by merchants for themselves, has become in large part a specialized form of business activity carried on by separately organized business units. To the simple function of storage has been added other operations incidental to and supplementary to putting goods in storage. Principal among these operations are the financing of customers of the warehouse by means of loans extended on the security of warehouse receipts. Requiring that insurance be carried on stored commodities as further protection for those who lend money on warehouse receipts is an extension of the financing function.

It is not unusual for warehouses to sort, mix, pack, or recondition commodities stored therein. The weighing, sampling, inspection and grading of goods is facilitated by the warehouse. These services combined with the issuing of warehouse receipts make the warehouse indispensable to the conduct of trade on organized produce exchanges.

The warehouseman often acts as agent for either buyer or seller in the receipt or distribution of goods. In this capacity he honors orders for goods in storage drawn upon him by the owner, distributes

[20] Prepared by E. A. Duddy.

the goods to the owner's customers, makes collections, and accounts to the owner periodically as an agent in the employ of the owner company might do.

More recently the warehouseman's function as a forwarding agent has come to play a leading part in carrying on his business. Full carloads of merchandise are received by the warehouse at a distributing center like Chicago and are there broken up into "less carload lots" for individual buyers at widely scattered points without ever going into storage.

What was once an unspecialized function of business generally has come to be broken up into a number of well-differentiated types. Following are the principal types of warehousing now in operation in the United States: general merchandise, of which the bonded warehouse is a modified form; cold storage; household goods and furniture; the warehousing of cotton, grain, tobacco, wool; railroad and wharf storage, yard and ground storage, pig-iron storage, office-record storage, implement and vehicle storage.

The *general merchandise warehouse* receives, stores, and forwards all kinds of manufactured goods and many staple commodities such as flour, sugar, coffee, and canned goods. More than 1,500 different articles of commerce may be found stored in these warehouses. In June, 1928, according to the Department of Commerce, there were 1,124 such warehouses doing business in the United States with a total capacity of 76,970,000 square feet of floor space. Of this total, about 70 per cent. was used for public warehousing. About 65 per cent. of this space used for public warehousing is occupied on the average throughout the year. About 75 per cent. of the total tonnage of goods received actually goes into storage.

As might be supposed, most of this general merchandise warehouse space is located in the manufacturing states; approximately 30 per cent was in the Middle Atlantic states, and 20 per cent of the total was in the East North Central states in 1928. The other Atlantic Coast states and the Pacific Coast were next most important. New York, Chicago, Philadelphia, Boston, Minneapolis—St. Paul, and Los Angeles are the chief centers of merchandise storage. There are about 6.5 cubic feet of merchandise space per capita in the United States.

A *cold storage warehouse,* according to the United States Department of Agriculture, is any place artificially cooled to a temperature of 45° F. or below, in which food commodities are stored and held for thirty days or more. A public warehouse is one in which the goods stored are not owned or controlled by the operators of the warehouse, but which the warehouseman receives and stores for a consideration.

For the year 1927, the Department of Agriculture reported a total of 667,846,573 cubic feet of cold storage space in the United States. Of this total 41 per cent. was public storage space; 36.8 was private space in meat-packing establishments; 10 per cent in meat-packing plants but operated as public space; 8.5 per cent in combined public and private plants, and 3.7 per cent in private plants.

The principle of refrigeration has a very wide use in industry today, the *Ice and Refrigeration Blue Book* listing sixty-one businesses in which refrigeration is used with a total of more than 731 million cubic feet of refrigerated space.

Public cold storage space is concentrated in much the same areas as general merchandise space. The Middle Atlantic states had, in 1927, 33.6 per cent of the total; the East North Central states 22.8 per cent; the West North Central 10.3 per cent, and the Pacific Coast states 12.3 per cent. There are about 2.5 cubic feet of public cold storage space per capita in the United States.

Chicago leads all other cities in total cold storage space. Other important centers are New York, Kansas City, St. Louis, Omaha, Boston, Indianapolis, Philadelphia, Cleveland, Los Angeles.

The *storage of household goods and furniture* had its beginning in the city of New York during Civil War days, but it was not until 1870 that this type of warehousing was put upon a sound basis by the erection of buildings especially designed for the purpose. Now this type of warehouse has not only a special kind of construction, but rooms which are designed and equipped for the safe storage of pianos, works of art, furs, etc., where temperature, dust, and vermin control are essential.

No data are available on the amount of this kind of warehouse space in the country as a whole. An estimate in 1924 indicates that at that time 27 per cent of total commercial warehouse space was used for the storage of furniture and household goods. Most of this space

is found in the large cities where population is more mobile than in the country or small town. The growth of the industry has been coincident with the growth of large cities and cheap transportation.

The *storage of a staple commodity* may be illustrated by the case of grain. The grain elevator originated at Buffalo, New York, in 1843 in response to the need for a cheap method of handling bulk grain. By means of rapidly moving belts to which buckets are attached, great quantities of grain may be unloaded from freight cars and boats into and out of these elevators with the use of relatively little human labor.

Grain elevators are distinguished either as country, mill, or terminal elevators. Country elevators are located along the railroads in the grain-growing states and serve as points of first concentration. Terminal elevators are found in the large interior grain markets and at the ports. The mill elevator is the property of the flour or cereal mill and is used for the private storage of grain. In 1927 there was a total mill and terminal grain storage capacity in the United States of 405 million bushels. Approximately two-thirds of this was terminal elevator space. Half of this terminal elevator space was at interior markets, while the other half was distributed among the lake ports of the Great Lakes and on the Atlantic, Pacific, and Gulf coasts. The last official estimate of country elevator storage was that of the United States Grain Corporation in 1918. The corporation reported a total of 21,542 country elevators with a capacity of more than 521 million bushels. Ninety per cent of country elevator space was in states of surplus grain production.

The principal centers of grain storage in the United States are Chicago, Minneapolis, Buffalo, Duluth–Superior, Kansas City, Omaha, St. Louis, Baltimore, New York, Philadelphia, and New Orleans.

Within market centers, grain elevators are found in close relation to water and rail transportation; in fact, direct access to the transportation system is indispensable. Congestion in the rail terminals of large interior markets is forcing grain elevators and other bulk storage facilities to locate on the outer edge of the city.

Warehouses for the storage of cotton are located at concentration points and at the ports for export. Mills which fabricate the cotton also maintain their own private storage facilities. Storage at the concentration point is incidental to the process of reducing the bulky

loose bale which comes from the gin to the compressed, high density bale of commerce. It is only after the cotton has moved from the gin to the compress point that it is allowed to go into storage.

The storage of cotton not only safeguards it against damage by weather and fire, but it facilitates sampling and grading into commercial grades and making up lots for sale to domestic and foreign buyers. By using the warehouse, too, the owner of the cotton is able to borrow at the bank on warehouse receipts issued by the warehouse. He is thus able to hold his crop for a favorable market with a resulting stabilizing effect on cotton prices generally.

The Bureau of the Census in 1923 estimated that the Cotton Belt had approximately 20,000 gin-compress warehouses and more than 4,000 public cotton warehouses.

In the warehousing of tobacco, the conditioning, inspection, and sale of the product are inseparable from the warehousing. The warehouse is the market place for the sale of the crop to the tobacco buyer. Storage runs from one to three years with warehouse receipts issued up to a three-year limit.

The warehousing of wool is carried on chiefly at ports of import, Boston, Philadelphia, and San Francisco being the principal points. The wool warehouse not only performs a storage function, but here the fleeces are sorted and graded into commercial lots for sale to a buyer. The multiplicity of grades makes it difficult to issue receipts upon which loans may be negotiated as in the case of grain and cotton.

Further specialization in warehousing is evidenced by separate facilities for the storage of tea, coffee, sugar, oil, rice, and canned goods. Still other articles of commerce create peculiar hazards for the general merchandise warehouseman and he ordinarily refuses to store them. Among these are such highly inflammable fibers as broom corn, corn silk, flax, hemp, hay, etc. In this class also belong highly dangerous explosives. Oils and chemicals which may contaminate other commodities with their odors form still another class. Specialized types of warehouses in which only such commodities are stored arise to meet these various needs.

Besides the kinds of storage already described there are types of warehousing which are essentially a part of the transportation service. *Railroad and wharf storage* where goods are held in transit sheds for

short periods of time is an example of this type. Such storage is a necessary link in the transportation of goods from boat to rail or vice versa, or at terminal points where goods are awaiting delivery to the consignee.

Yard and ground storage applies to such commodities as sand, gravel, coal, ore, lumber, etc., which may be piled up out of doors with a minimum amount of damage to the commodity. The lot upon which such property is piled, if properly fenced, is a legally constituted warehouse.

B. COLD STORAGE[21]

The use of cold in preserving food stuffs has a long history. No one knows who discovered the idea of the use of cold as a preservative; it may well be that primitive man merely by chance found the preserved flesh of some animal frozen in its lair or caught in a snowdrift and so learned the connection between coolness and keeping foods from spoiling. Pits, caverns, and caves 20,000 years old have been found in north central Europe, which evidently were used as cold storage devices by prehistoric man.

Coming down to historic times we find considerable use of ice. In the Songs of Solomon we read of ice being used to cool both food and drink. Hippocrates, a Greek physician, in 460 B.C. feared for the results of cold food and drink on the human system. In India from ancient times it has been the custom to make ice by the quick evaporation of water by putting flat dishes filled one-half inch with water in a box twenty inches deep filled with straw; during dry nights part of the water evaporates and the rest freezes, being well insulated against the outer air. The Egyptians hastened the evaporation by waving palm branches over the water all night. Nero, in Rome, had ice houses built for storing the natural ice supply, which was used in the preservation of dainties and in cooling drinks. As early as the twelfth century the Chinese cooled water by a mixture of snow and saltpetre, a practice Europe learned about 1550. In 1607 an Italian found that by repeating the mixture of saltpetre with snow a liquid could be brought to a very low temperature, and he froze a glass of water by moving it in a mixture of ice or snow and saltpetre.

[21] Adapted from an unpublished manuscript by Dwight L. Palmer, *Some Social and Business Aspects of Storage.*

The end of the seventeenth century markes a change, in that ice was being more fully appreciated for its practical utility. The business of serving ice to the public began in France. It first came to respectable size in Great Britain and Germany, the ice being brought from Norway. The year 1799 marks America's entrance into the ice trade, for in that year ice was taken to the West Indies. Ice had been used by the colonists for food preservation earlier, as they either learned the practice from the Indians or from England. Natural ice production was further increased by the calls of the government for ice in the hospitals during the Civil War. By 1879 the trade reached its apex; over 1,300,000 tons of ice were harvested in Maine that year; and in 1880 there were 135 ice plants on the Hudson River between Albany and New York. After 1880 the natural ice trade fought a losing battle with mechanical refrigeration, and by 1890 it had sunk to negligible importance.

The first cold storage plant for fruit was built in 1856. It made use of natural ice mixed with salt and placed in galvanized iron tanks along the walls of the cold room. Nine years afterward an improved warehouse in New York made use of natural ice but a system of closed coils was used whereby the coolness of the ice was transferred to brine (salt water) and the latter circulated around the produce. This was not mussy, high humidity was avoided, and there was no opening of doors for reicing to let in heat. In 1869 the first carload of iced beef went from Chicago to New York. A ship brought eighty tons of Argentine beef to France in 1878. From that date on the exporting of American meats to Europe was a rapidly growing industry.

Lord Bacon in England was one of the first among scientific men to become interested in the use of cold, pointing out how valuable it would be if man had the same control over cold he already had over heat. Dr. William Cullen in 1755 invented a machine for producing cold by partial evaporation of water placed in a shallow dish in a vacuum. Joseph Priestley in 1774 extracted ammonia from compounds and called attention to its excessive solubility in water, thus foreshadowing its later use. Dr. Joseph Black (1728–99) proved that any change of substance from one state to another, such as from a liquid to a gas, involved a change in energy, of which heat and cold are examples.

The absorption system of using ammonia in refrigerating machines was invented in 1850. A vessel or boiler called the generator was filled with a strong solution of ammonia and was provided with a coil into which steam might be turned or water admitted, depending on whether the generator was to be heated or cooled. Upon heating the ammonia the expansion of the gas caused an increase in pressure which forced the gas through a valve to the condenser, where it was cooled by running water and condensed to a liquid. Then it was turned into a receiver and was allowed to flow into an evaporation coil, which produced the actual refrigeration. An ammonia absorption machine was exhibited at the Paris Exposition in 1867. This made six tons of ice a day. In 1853 Professor A. C. Twining invented his machine using ether as a refrigerant. In 1855 he produced 1,600 pounds of ice daily, which was distributed in Cleveland among householders and butchers.

A most important incentive to the development of cold storage was the growth of cities. More than half of the United States' 110,000,000 people are now city-dwellers, separated from the sources of food supply. In a non-refrigerated distribution system this would mean that only those foods would be found in urban stores which do not need cold storage to preserve them until they reach the consumer. The diet of city folk in respect to meat, berries, green vegetables, and milk would be very restricted; only the amounts produced by nearby farmers which could be gotten quickly to the consumer from farm, dairy, or slaughter house would be available. This would mean a poor selection, higher prices, and an absolute dearth of such foods during the seasons when they were not grown or produced.

Cold storage encourages production by giving a widened market —it renders the demand of a far-off city as alluring as the old local demand of one's neighbors; and the increase in physical proportions is tremendous, as witness the growth of total population and of urban development. The results of mechanical refrigeration upon the raising of fruit has been important and extensive. The old system under which a farmer merely raised a small amount of a variety of fruits for family and local use has been changed. By mechanical refrigeration great areas of orchard land have been planted to a single crop such as apples. This specialization of a large producing area has had

important results in changing old processes and methods. The varieties of fruits planted are carefully studied and selected with a view to market demand. The picking is done by trained workers to eliminate injury to the fruit. The grading is done by experts and packing and shipping are arts in themselves. All of these changes have resulted in benefits both to the producer in increasing his income and to the consuming public in giving them high quality, standard products the year around.

Refrigeration thus makes possible the development on a commercial scale of activities which previously were carried on in a haphazard manner with the attendant high cost per unit which goes with dealing merely with the local demand. Refrigeration fits itself into the marketing scheme of the products it protects in a full and effective way. On the farms are established small storehouses, which hold the produce from time of picking until shipment date and also serve as precooling plants. Refrigerator cars move the fruit to the market. In the central markets and in the large port cities cold storage houses are ready to hold the goods until the market will demand them.

Year	Space Cubic Feet
1904	102,500,000
1909	160,100,000
1911	169,541,000
1914	200,000,000
1917	237,000,000
1921	266,000,000
1923	297,800,000
1925 (est.)	400,000,000

Increase of Public Cold Storage Space in the United States

The cold-storage industry has aided especially the perishable products of an outstanding seasonal character. Eggs are a type of these, although there are many others—butter, cheese, tomatoes, potatoes, etc. Fifty per cent of the country's eggs are produced between March and June. Before cold storage was possible this meant that the farmer had to sell eggs to the local consumers and was forced to throw the heavy spring production suddenly on the market, thus depressing prices greatly. The result was that egg-producing was unsatisfactory to the farmer and that the city-dwellers had to go without eggs part of the year or else pay excessive prices for them. Refrigeration allows the producer to store his surplus during the spring months, giving him

a chance to market the product throughout the year, and the city consumer is assured of eggs the year round. Today the cold storage houses handle 86 per cent of the egg production. The months of heaviest storage are March, April, and May. The incidental results of refrigeration are great. It does not pay to store an egg unless it is in "A1" condition. This has led to some reorganization of the egg-producing industry. Hens are now scientifically selected and bred. Their food is carefully chosen with a view to maximum egg production. Clean nests are provided. The eggs are gathered often and are sent quickly to the local warehouses. Candling (inspection against a light) eliminates the unfit. Standard grades have been evolved and set. To the farmer it has meant the necessity for better methods and this led to a standard high-grade product. To the consumer refrigeration of the egg industry meant an available egg supply twelve months a year, product of much higher quality, and a uniformity of prices that was impossible earlier.

5. THE BOOK A TYPE OF COMMUNICATING CAPITAL GOODS[22]

The book of the twentieth century requires the following: thoughts of the writer; language in which he may express his thoughts; alphabetic symbols in which he may express his language in writing or printing; paper; the book form of bound sheets; printing ink; mechanical process for printing; mechanical process for making the alphabet in metal so that it may be used for printing (types); mechanical process for arranging the letters in the correct order for printing; mechanical processes for binding; mechanical power to motivate these machines; demand sufficiently large and constant to warrant large-scale production.

To give definiteness to the time conception in the development of the technique of the book down through the ages, let us imagine ourselves marking off the centuries on the face of an imaginary clock which is divided into the usual twelve-hour intervals, each hour representing five hundred years. For the purposes of this history clock we shall assume that the book was first made at a time represented by the figure twelve on the dial. For example, in Egypt and in Mesopo-

[22] Prepared by Louella Arnold Kaufman.

tamia writings which may be called books were being made on leaves, stones, ivory, crudely prepared skins, and other surfaces.

The hour hand on the imaginary dial turns. As it reaches one, it represents time about five thousand five hundred years ago. At that time, in a few of the more favored spots on the world-surface, man had learned to make fairly satisfactory books which were somewhat modern in appearance. Probably the kind of book most nearly modern in appearance at that time was the Egyptian papyrus roll. Papyrus *resembled paper;* it was more nearly like modern paper than any other material of the older cultures. Like paper, papyrus was more portable than rocks or stones; it was more durable than leaves.

The hour hand on the dial turns to two, three, four, five, six, and seven. That time represents more than half of man's book-making career. There was no significant change in the technique of the book up to the time represented by half past seven on the dial. Slightly before eight o'clock on the imaginary dial the book-making technique in the Museum of Alexandria—that famous university in northern Egypt—is reached. The Alexandrian book was still the rolled papyrus; it was still written laboriously by hand.

At about the beginning of the Christian era—four hours ago on the imaginary clock—the center of the book trade and of book production swung over to Rome from Alexandria. In Rome, as in earlier centers of book production, book-making was simple. In essence, it consisted of writing the books through one by one as they had been written since the beginning of book-making. Although parchment was known, papyrus was still by far the most common writing surface. The old roll form was still paramount but a new book form was slowly coming into usage at that time. This new *form* was made up *of bound sheets*—the same form as that used in the twentieth century, A.D. The Romans called this book of bound sheets the "codex" as distinguished from the volume (the roll). The codex form of the book was made possible, in a large measure, by the increasing availability of parchment. Parchment was much stronger than papyrus—strong enough to stand without tearing the piercing that was necessary to bind the sheets together. Further, the improvement in the preparation of the skins which made it possible to write on both sides (this had not been the case with papyrus) facilitated the transfer to the new book form.

Let us return again to the dial of our imaginary clock. As the hour hand passes to nine—only three hours ago—and on to ten and a little beyond, it is passing over that period known as the Dark Ages. During this time the technique of the hand-written book was brought to a high state of perfection, if sole reference is made to the beauty of the book. The book was a work of art but was so expensive that it meant nothing to the huge majority—to all but a very few, in fact—of the population of Europe. In the main, books were made for and by monks and nuns in isolated monastic institutions.

Within the last hour, as measured on the imaginary clock, man has made such radical changes in the technology of his book that it is now largely a product of the machine. Within these last five hundred years he has learned to make and arrange his letters, make his paper, print and bind his books by machines motivated by mechanical power. The first radical change in his methods of book production came when he substituted printing on a hand-operated press for handwriting. This occurred in the middle of the fifteenth century.

The invention in the middle of the fifteenth century is often spoken of as the "invention of printing" but it is, more accurately, the "invention of typography." "Typography," which means printing from movable type, is not synonymous with "printing" for the latter includes, in addition to typography, such as these: xylography (printing from solid wooden blocks), lithography (printing from smooth surfaces), and copper-plate printing. Typography involves the emergence of the idea of printing from movable type and its application in a practical mechanism. Even in its simplest form, as used in the fifteenth century, typography could not be used satisfactorily and extensively until man had learned that he could print from units; until he had learned to make these letter units (types) from metal so that they would be durable and accurate; until he had an ink that was glutinous so that it would press into the printing material (parchment or paper) without leaving blotches, and until he had an adequate and inexpensive supply of material on which to print. This last means that typography was dependent upon the technology of paper-making.

The essential characteristic of paper-making is the netting together of pulped vegetable fibers. Whether they are made from bamboo, the mulberry, or other tree, from cotton, flax, or any of the

numerous other vegetable sources, the fibers are pulped into a soft mass of tiny bits. Those little portions of fibers are then felted together to form sheets of paper.

After having been invented in eastern China in about 105 A.D. the secret of paper manufacture worked to the West very slowly. In 751 A.D. paper-making entered the Arabian world and started on its journey to Spain and thence to Christendom. During the year 751 two Turkish chieftains were engaged in war. One hired the aid of the Chinese and the other was assisted by a band of Arabs. The Arabs were victorious. They took many prisoners, among them several Chinese paper-makers. These Oriental paper-makers taught their conquerors, the Arabs, the secret of paper manufacture according to the process which had been invented in China in the second century. Paper soon became the common writing material among the Arabians. It was natural that the Arabians would carry their paper-making to their cities in northern Africa and also to their settlements in Spain. The year 1150 marked the entrance of paper-making into Europe by means of this transmission of the secret of its manufacture by the Arabs as they extended from the Near East toward the West and into Spain. In the meantime, paper had entered Europe as an article of commerce from the cities of the Near East, particularly from Damascus, entering through Constantinople. Paper also entered Europe through Sicily from the cities in northern Africa. Up to this time paper was entirely in the hands of the Saracens. But in 1189 the first Christian paper mill was established at Hernault in France; the first Italian mill—also in Christian territory—was running in 1276. After this time Christendom took the lead in paper manufacture.

The pressure required to print is furnished by a machine called a *press*. Presses were not new to Europeans in the middle of the fifteenth century for Europe already had a device, which in essentials was like the printing press, that had been used very commonly for pressing cheese and making wine from grapes. These old wine and cheese presses, from which the printing presses were adapted, were very simple. They were entirely of wood, consisting of a framework which supported two flat horizontal surfaces parallel to each other. These surfaces could be brought into contact by the action of a screw

working through a nut. The power was transmitted into the machine by a bar working in the nut. The operation was by hand.

These little presses, which were operated with so much difficulty, printed slowly. It is said that Gutenberg's shackly wooden press could make twenty impressions in an hour. Although there can be no comparable figures by which the rate of output in hand-written books might be compared with those of the hand-operated presses, it is probable that even this crude little press that made only twenty impressions in an hour could work faster than books could be written by hand. But in comparison to the presses of the twentieth century the early hand operated presses were snail-like in their operation. With the modern printing press of sheet capacity of 2,600 in an hour (1,300 on both sides) the rate of output of the modern press, if 32 pages are printed on one bed, is two thousand times as great as that of the press of the early typographers. As a matter of fact, this huge difference between the possible output of the old and the new book presses is conservative. Some of the early presses—perhaps the majority—printed only one page at a time.

Let us return to the imaginary clock on which we have measured the passing time in the developing technique of the book. On that clock we have seen that Western man had hand-written books for eleven of the twelve hours in his book-making career. One hour ago he learned to print his books in a hand-operated machine. Before the modern, abundantly-produced book could be made the following were necessary: mechanical process in paper-making; better mechanical process for printing; mechanical process for making the alphabet in metal; mechanical process for arranging the letters in the correct order for printing; mechanical processes for binding; mechanical power to motivate these machines; demand sufficiently large and constant to warrant large-scale production.

Before the opening of the nineteenth century pulp had been beaten in Europe in a crude machine. During the sixteenth century the beating had been accomplished by a device which consisted of a wooden cylinder evenly spiked with projections. The cylinder was revolved by force generated by a water wheel or windmill. The projections on the cylinder revolved and then heavy wooden stampers were dropped. These stampers beat against the torn rags that were within the tank.

This crude device accomplished exactly the same thing as the Oriental paper-maker as he beat his pulp and then mixed it with water with his hands. About 1750 the Hollander beater was invented to perform much the same function. In essence, the Hollander, which is still in use as improved and enlarged, is a tub with rounding ends in which revolving knives are so arranged that they may macerate the raw material into pulp rapidly. This machine, motivated by mechanical power, enormously increased productivity in the paper industry.

The sheet-making machine developed later. Up to the first of the nineteenth century every sheet of paper in the world had been made sheet by sheet by hand on a sieve in a manner essentially the same as that used in the Oriental paper-maker's shop. In 1798—only two years before the iron printing press was invented—Louis Robert, a Frenchman, patented an invention for making paper sheets in an endless web. Fourdenier and his assistants improved the machine, putting it into practical operation in 1803. The sheet-making machine, which still bears the name of Fourdenier, is so constructed at the present time that pulp flows in at one end of the machine, passes over an endless wire cloth and over several steam-heated rollers, and emerges at the opposite end of the machine in a dry continuous sheet of paper. The machines vary in size and capacity, but it is interesting to know that one of the largest Fourdenier machines in the twentieth century can make paper 180 inches wide and run at a speed of 650 feet a minute. This machine produces 76,000 pounds of paper in twenty-four hours. This is in startling contrast to the meager output of the hand workman.

After books were first printed typographically, the technique of printing almost marked time for three hundred and fifty years—for more than forty minutes on the imaginary clock. In groping for some manner of increasing the output from the press so that books and newspapers might be supplied more abundantly after 1750, it is obvious that the printers would attempt, also, to use some of the kinds of non-human power which were being applied in other forms of industry. Contemporary writers mention the use of water power, horse-power, and the steam engine (after its invention in 1782) in connection with the ordinary wooden press as it existed before 1800 (much like the wooden press of 1450) but, although these power forces could

apparently drive the printing machine, results were not sufficiently satisfactory to justify their general adoption.

While some persons were experimenting trying to make the platen on the old wooden machine larger and while others were applying water power, horsepower, and the steam engine to this old platen press in the vain attempt to satisfy book wants more abundantly, William Nicholson, of London, was dreaming of a very different kind of printing machine. All printing machines previously had used flat surfaces in impression-making. Nicholson took out a patent in England in 1790 for a machine in which he substituted cylinders for flat surfaces. Nicholson's prophetic patent did not stop with the cylinder press, for his patent covered a principle in printing mechanism which involved the use of two cylinders, one for the impression-making and the other to hold the type. Both cylinders, upper and lower, rotated and between their curved surfaces as they came into contact the printing impression was made on paper. This idea contains the fundamental principles upon which rotary presses—our newspaper and periodical presses—are built today.

While the press-makers were attempting to invent a better platen machine to be operated by hand power, Koenig, a Saxon who worked in England, was trying to apply steam power to the platen press. But sometime before 1810 Koenig gave up the idea of motivating a platen press by steam and became converted to the cylinder principle which Nicholson had foreseen in his patent of 1790. Koenig patented a *steam-driven cylinder press* in 1811 and thereby made the most significant improvement in printing technique since the invention of typography in 1450. The steam press could make 1,100 impressions an hour, while the best platen press of the time could print only 300 impressions in an hour.

Although typesetting machines were known as early as 1822, the first machine to be generally adopted for arranging type was the linotype, which has come into usage within the last fifty years. The first patent on the linotype was taken out in 1875, but as late as 1893 compositors were still debating whether or not typesetting machines would prove ultimately successful in their field. Another machine for typesetting which is preferred by many book-makers is the monotype which casts and sets individual types. The monotype was first ex-

hibited at the World's Fair in 1893. Monotypes have revolutionized modern book composition for even the best work can be set on this ingenious machine. It is not too much to say that the modern book of good quality could not be produced as abundantly and cheaply if it were not for the monotype. The revolution in composition has thus been accomplished within the last six minutes on our imaginary book clock.

The revolution in binding has been as recent in its successful culmination as that in composition. Early attempts were made in binding machinery but, probably due to the variety of processes involved as well as to the intricacy of the binding operations, the revolution—the application of the power machine—was delayed. Two of the most significant book-binding machines of the present (and there are many) are the case-making and the casing-in mechanisms. A practical case-making machine was put on the market in 1896—only thirty years ago. This machine assembles cloth for covering, board (pasteboard for the covers), back lining, and glue, turning out completed cases at the rate of from five hundred to seven hundred and fifty an hour. Another machine adapted to huge editions will make one thousand cases in an hour. The casing-in machine, which has come also within the last thirty years, is one of the most revolutionary binding mechanisms. By its use, the binder attaches the case, which is already made, to the sewed book. This machine averages five hundred books an hour. These two processes, in their speeding up by mechanization are typical of most other operations in book-binding.

The revolutionary developments in the fields of composition and binding since about the year 1880 have not been the only changes in the technology of the book. In addition, the chemist has given the printer a variety of ink; illustration processes based upon photography—zinc etchings and halftones—are a vast improvement upon the old xylographical block prints; electrotypes and stereotypes have been brought to a high state of perfection. Further, *electrical power* has come to furnish a large share of the motivating energy required in book-making. The industry has become almost totally mechanized within this last six minutes on the imaginary book clock.

The *Publishers' Weekly* gives the following estimate of the number of books published from 1450 to 1908:

Periods	Books Published	
1450–1500	30,742	
1500–1600	285,824	
1600–1700	972,300	
1700–1800	1,637,196	
1800–1900	6,100,527	
1900–1908	1,395,552	
Total 1450–1908		10,422,141

These figures, as far as is known, refer to number of titles published not to total number of copies. If the total number of copies were available, obviously total book production portrayed would be vastly larger.

See also "The Newness of Present-Day Living," page 248.

C. Some Consequences of the New Technology

Thus far in our discussion of the physical equipment of civilization we have been concerned with getting a reasonably clear idea of the classes of capital goods which we use; with reaching an understanding of *why* the chemical, the bacteriological, and especially the mechanical technology is so useful in production; and with seeing our capital goods—especially our active capital goods—at work in a few typical industries. It now remains to deal with certain general considerations with respect to the creation and utilization of capital goods. We shall again draw our illustrations and problems mainly from the mechanical field.

It is obvious that capital goods are physical things. It is equally obvious that capital goods do not rain down from heaven; they are the result of effort. It "costs something" to make them. If our available stock of social energy is thought of as being made up of natural resources, labor, capital goods, and organization, it is clear that some of this social energy is absorbed every time a *new* capital good is made. The same remark may be made of every repair or improvement or replacement of an existing capital good.

Although the use of capital goods greatly increases the amount of consumers' satisfactions ultimately available, their use is not all clear gain. Among the more significant subtractions which must be kept in

mind are the costs of producing and maintaining the capital goods, the irksomeness of waiting, the cost of inventing and experimenting, and the costs of scrapping old forms of capital goods when better forms have been invented.

Thus far our discussion of capital goods has been in terms of an increased output of consumers' goods. But capital goods do more than increase output. They react upon the character of the work that is performed and thus cause man to perform his activities in a new régime. This is readily appreciated when we view the matter historically. It is easy to see, for example, that the coming in of certain types of capital goods (such as the electric magnet or the steam crane) greatly relieved man from the drudgery of hard lifting and dull carrying. Other types of capital goods, such as the automatic machine, are really manifestations of a transfer of thought, skill, and intelligence from the former skilled worker to the machine, with resultant effects upon the worker's technique of production, his bargaining position, and his whole mental outlook.

So great has been the effect of the machine upon our technique of production, and indeed upon our whole social organization, that some writers raise the question whether the machine today is the master, and man the slave.

The following selections have been pointed toward these issues:[22a]

1. In what respects has the power-driven machine meant new situations for the worker?
2. In what respects have the exigencies of the machine process led to standardization? To a more varied life?
3. Upon what does it really depend whether the power-driven machine (that is to say, modern technology) is to be our master or our servant?

1. THE TRANSFER OF THOUGHT, SKILL, AND INTELLIGENCE[23]

Suppose it be desired to drill four holes in a number of plates, so that they bear a certain fixed relation to the edges of the plate; and suppose the operator to be equipped with the ordinary drilling ma-

[22a] A more detailed statement of issues may be found in *Outlines of the Economic Order*, pp. 112–18. (University of Chicago Press.)

[23] Adapted by permission from D. S. Kimball, *Principles of Industrial Organization*, pp. 10–13. (McGraw-Hill Book Co., Inc., 1913.)

chine which guides the drill so that it pierces the plate squarely. To drill these holes in *one* plate, with any degree of accuracy, requires a high degree of skill on the part of the operator; and to drill any number of such plates so that the spacing of the holes in them will correspond closely with those in the first plate requires a very high degree of manual skill, considerable time per plate, and is a very costly operation.

Suppose, however, a skilled workman makes a so-called "drilling jig" in which the plate can be securely clamped by set screws and in which all the plates can in turn be clamped in exactly the same position. The plate contains four holes, which have been very carefully located to correspond with the required location of the holes.

Now it is evident that almost any *unskilled* person can drill the plate, when so held, as accurately as the most skilled workman can without it. Further, he cannot drill the plate *inaccurately*. True, he must have a slight amount of training in handling the drilling machine, but this is small and soon acquired. *The accuracy of the work no longer depends on the skill of the operator but on the accuracy of his tools.*

This principle, illustrated above, has been aptly called "The Transfer of Skill," and it is to be especially noted that this principle has nothing to do with division of labor, though, as can be seen, it allows an extension of the same. Nor is the principle inherently applicable to *machines* alone; it can be and is applied to hand methods. True, most machines are constructed with this end in view, the drilling machine mentioned above, for instance, having this characteristic in so far as guiding the drill vertically is concerned.

It is evident that for a given operation the more skill that is transferred to the machine the less is required in the operator. When nearly all the skill has been so transferred, but the machine still requires an attendant, it is called a *semi-automatic machine*. Turret lathes are excellent examples of this class of machinery.

In drilling the plate without the jig the skilled mechanic must expend *thought* as well as skill in properly locating the holes. The unskilled operator need expend no thought regarding the location of the holes. That part of the mental labor has been done once for all by the toolmaker. It appears, therefore, that a *transfer of thought* or *intelligence* can also be made from a person to a machine. If the

quantity of parts to be made is sufficiently large to justify the expenditure, it is possible to make machines to which all the required skill and thought have been transferred and the machine does not require even an attendant. Such machines are known as *full automatic machines.* Automatic screw machines are excellent examples of a complete transfer of skill and thought. Care should be taken to distinguish clearly between *transmission* of intelligence, as illustrated in drawings, specifications, and written or spoken communications in general, between *men* and the transfer of intelligence or thought from a skilled man to a *machine.* These principles, transfer of skill and transfer of thought, lie at the bottom of modern industrial methods. Under former and simpler methods of manufacture the machine was an aid to the worker's skill, the amount of skill that had been transferred being very small. In the new machines the transfer of skill and thought may be so great that little or none of these are required of the attendant worker.

[NOTE.—The foregoing illustrates a principle. The application of this principle in the increasing use of automatic machinery is of wide extent and tremendous social significance. It should be noticed, too, that there is occurring a transfer of thought, skill, and intelligence to management. Scientific management is a phase of this movement.]

See also:
"Industrial Standardization," page 791.
"The Beginnings of Scientific Management," page 795.
"Principles and Devices of Scientific Management," page 800.
"Impersonal Laws of Management," page 803.

2. STANDARDIZATION AND THE MACHINE PROCESS[24]

The modern industrial communities show an unprecedented uniformity and precise equivalence in legally adopted weights and measures. Something of this kind would be brought about by the needs of commerce, even without the urgency given to the movement for uni-

[24] Adapted by permission from Thorstein Veblen, *The Theory of Business Enterprise*, pp. 8–14. (Charles Scribner's Sons, 1912.)

formity by the requirements of the machine industry. But within the industrial field the movement for standardization has outrun the urging of commercial needs, and has penetrated every corner of the mechanical industries.

As a matter of course, tools and the various structural materials used are made of standard sizes, shapes, and gauges. When the dimensions, in fractions of an inch or in millimetres, and the weight, in fractions of a pound or in grammes, are given, the expert foreman or workman, confidently and without reflection, infers the rest of what need be known of the uses to which any given item that passes under his hand may be turned.

The materials and moving forces of industry are undergoing a like reduction to staple kinds, styles, grades, and gauges. Even such forces as would seem at first sight not to lend themselves to standardization, either in their production or their use, are subjected to uniform scales of measurement; as, e.g., water-power, steam, electricity, and human labor. The latter is perhaps the least amenable to standardization, but, for all that, it is bargained for, delivered, and turned to account on schedules of time, speed, and intensity which are continually sought to be reduced to a more precise measurement and a more sweeping uniformity.

The like is true of the finished products. Modern consumers in great part supply their wants with commodities that conform to certain staple specifications of size, weight, and grade. The consumer (that is to say, the vulgar consumer) furnishes his house, his table, and his person with supplies of standard weight and measure, and he can to an appreciable degree specify his needs and his consumption in the notation of the standard gauge.

From this mechanical standardization of consumable goods it follows, on the one hand, that the demand for goods settles upon certain defined lines of production which handle certain materials of definite grade, in certain, somewhat invariable, forms and proportions; which leads to well-defined methods and measurements in the processes of production. Besides this, the standardization of goods means that the interdependence of industrial processes is reduced to more definite terms than before the mechanical standardization came

to its present degree of elaborateness and rigor. The margin of admissible variation in time, place, form, and amount is narrowed. Materials, to answer the needs of standardized industry, must be drawn from certain standard sources at a definite rate of supply.

Machine production leads to a standardization of services as well as of goods. So, for instance, the modern means of communication and the system into which these means are organized are also of the nature of a mechanical process, and in this mechanical process of service and intercourse the life of all civilized men is more or less intimately involved. To make effective use of the modern system of communication in any or all of its ramifications (streets, railways, steamship lines, telephone, telegraph, postal service, etc.) men are required to adapt their needs and their motions to the exigencies of the process whereby this civilized method of intercourse is carried into effect. The service is standardized, and therefore the use of it is standardized also. Schedules of time, place and circumstances rule throughout. The scheme of everyday life must be arranged with a strict regard to the exigencies of the process whereby this range of human needs is served, if full advantage is to be taken of this system of intercourse, which means that, in so far, one's plans and projects must be conceived and worked out in terms of those standard units which the system imposes.

For the population of the towns and cities, at least, much the same rule holds true of the distribution of consumable goods. So, also, amusements and diversions, much of the current amenities of life, are organized into a more or less sweeping process to which those who would benefit by the advantages offered must adapt their schedules of wants and the disposition of their time and effort. The frequency, duration, intensity, grade, and sequence are not, in the main, matters for the free discretion of the individuals who participate.

See also:
"Some Significant Standards, Their Meanings and Purposes," page 365.
"Industrial Standardization," page 791.

3. THE NEW STRAIN IN INDUSTRY[25]

What are the special forms of overstrain found in modern industry viewing industrial conditions, as was our premise, from the physiological point of view? In a brief sketch of this vast field it will be possible to single out only a very few features for comment. We can do no more than glance, as it were, at some of the innumerable processes which directly or indirectly feed the machinery of the world, supplying man's needs and luxuries.

Of those elements in industry which are most characteristic and which make the greatest demands on human energies, we may select the following: speed and complexity, monotony, piece-work, and overtime. Other fatiguing influences in machine work, such as noise and the mechanical rhythms, will of necessity come within the scope of our brief analysis, as well as the now recognized relation between fatigue and the incidence of industrial accidents.

The fatiguing effect of the roar of machinery is chiefly due to its influence upon the faculty of attention. Mental fatigue is "characterized pre-eminently by a weakening of the powers of attention." Voluntary attention is essentially a selective process, a "focalization and concentration of consciousness" upon one thing or a few from among the multiplicities, physical and mental, in whose midst we live. There is thus in attention a sensation of effort, and fatigue of attention is in direct proportion to the continuance of the efforts and the difficulty of sustaining them. Now, under the influence of loud noise, attention is distracted and the difficulty of sustaining it increased.

Thus noise not only distracts attention but necessitates a greater exertion of intensity or conscious application, thereby hastening the onset of fatigue of the attention. A quite uncounted strain upon this easily fatigued faculty results among industrial workers, such as girl machine operators, when the deafening intermittent roar of highly speeded machinery adds its quota to the tax of a long day's work. The roar is not even continuous enough to sink into monotony. With each stoppage and starting of a machine, it bursts out irregularly.

The subject of noise in industrial establishments is usually dismissed with the remark that the workers "get used to it," and doubt-

[25] Adapted by permission from Josephine Goldmark, *Fatigue and Efficiency, passim.* (Charities Publication Committee, 1912.)

less, in many occupations, the workers themselves are scarcely, or not at all, conscious of any increased application on their part due to the noise. But, in the main, the process of getting used to it involves precisely that increased intensity of nervous effort, that "feeling of being coerced," of which Wundt speaks in the laboratory experiments, and which, as we have seen, is most favorable for the approach of exhaustion.

The strain of machine work upon the faculty of attention thus leads to the gravest consequences. Another subtly fatiguing element in machine work, which we have not yet examined, is due to its rhythm. It is apparent that the rhythm of any power-driven machinery is fixed and mechanical, depending upon its construction and its rate of speed. Now it is true also that human beings tend to work rhythmically, and when the individual's natural swing or rhythmic tendency must be wholly subordinated to the machine's more rapid mechanical rhythm, fatigue is likely to ensue.

The increase of diseases of the nervous system among working people in the last decade is a fact that is now firmly established by extensive and a carefully conducted statistical inquiry. Whatever different causes of neurasthenia may be brought forward by different authors since Beard depicted its general features, there is one point on which all are agreed; namely, that the modern organization of industry with all its factors and sequels is a most prolific source of neurasthenia.

Intemperance, debauchery, and improvidence are the chief blemishes on the character of the factory work people, and those evils may easily be traced to habits formed under the present system, and springing from it almost inevitably. On all sides it is admitted that indigestion, hypochondriasis, and languor affect this class of the population very widely. After twelve hours of monotonous labor and confinement, it is but too natural to seek for stimulants of one kind or another; but when we superadd the morbid states above alluded to, the transition to spirits is rapid and perpetual.

See also "Strain and Monotony," page 841.

4. THE MACHINE AND THE LABORER[28]

In considering the influence of machinery upon the quality of labor, i.e., skill, duration, intensity, etc., we have first to meet two questions: What are the qualities in which machinery surpasses human labor? What are the kinds of work in which machinery displaces men? Now, since the whole of industrial work consists in moving matter, the advantage of machinery must consist in the production and disposition of motive power. The general economies of machinery are two: (1) the increased quantity of motive force it can apply to industry; (2) greater exactitude in the regular application of motive force (*a*) in time—the exact repetition of the same acts at regulated intervals or greater evenness in continuity; (*b*) in place—exact repetition of the same movements in space. All the advantages imputed to machinery in the economy of human time, the utilization of waste material, the display of concentrated force, or the delicacy of manipulation are derivable from these two general economies. Hence it follows that wherever the efficiency of labor-power depends chiefly upon the output of muscular force in motive power, or precision in the regulation of muscular force, machinery will tend to displace human labor. Assuming, therefore, that displaced labor finds other employment, it will be transferred to work where machinery has not the same advantage over human labor, that is to say, to work where the muscular strain or the need for regularity of movement is less. At first sight it will thus seem to follow that every displacement of labor by machinery will bring an elevation in the quality of labor, that is, will increase the proportion of labor in employments which tax the muscles less and are less monotonous.

One direct result of the application of an increased proportion of labor-power to the kinds of work which are less "muscular" and less "automatic" in character, will be a tendency toward greater division of labor and more specialization in these employments Thus the routine or automatic character which constituted the monotony of the work in which machinery displaced these workers will now be imparted to the higher grades of labor in which they are employed, and these in their turn will be advanced towards a condition which will render them open to a new invasion of machinery.

[28] Adapted by permission from J. A. Hobson, "The Influence of Machinery," *Political Science Quarterly*, VIII (1893), 111–23.

Nor is it shown that the introduction of machine production tends to diminish the physical strain upon the worker. As regards those workers who pass from ordinary manual work to the tending of machinery, there is a great deal of evidence to show that their new work taxes their physical vigor quite as severely as the old work. When any muscular or physical effort is required, it is pretty evident that an increased duration or a greater continuity in the slighter effort may tax the body quite as severely as the less frequent application of a much greater bodily force. There can be no question that in a competitive industrial society there exists a tendency to compensate for any saving of muscular or other physical effort afforded by the intervention of machinery, in two ways: first, by "forcing the pace"—compelling the worker to tend more and more machines, and to increase the strain, if not upon the muscles, then upon the nerves; secondly, by extending the hours of labor.

Now to come to the question of "monotony." Is the net tendency of machinery to make labor more or less monotonous, to educate the worker or to brutalize him? Does labor become more intellectual under the machine? Professor Alfred Marshall, who has thoughtfully discussed this question, inclines upon the whole in favor of machinery. It takes away manual skill, but it substitutes higher or more intellectual forms. "The more delicate the machine's power, the greater is the judgment and carefulness which is called for from those who see after it." Since machinery is daily becoming more and more delicate, the tending of machinery is becoming more and more intellectual. The judgment of Mr. Cooke Taylor in the conclusion of his admirable work, *The Modern Factory System*, is the same.

The question of the net intellectual effects of machinery is not one which admits of positive answer. It would be open to one to admit with Mr. Taylor that the operatives were growing more intellectual and that their contact with machinery exercises certain educative influences, but to deny that the direct results of machinery upon the workers were favorable to a wide cultivation of intellectual powers, as compared with various forms of freer and less specialized manual labor. The intellectualization of the town operatives (assuming the process to be taking place) may be attributable to the thousand and one other influences of town life rather than to machinery, save indi-

rectly so far as the modern industrial center is itself the creation of machinery. It is not, I think, possible at present to offer any clear or definite judgment. But the following distinctions seem to have some weight in forming our opinion.

1. The growth of machinery has acted as an enormous stimulus to the study of natural laws. A larger and larger proportion of human effort is absorbed in processes of invention, in the manipulation of commerce on an increasing scale of magnitude and complexity, and in such management of machinery and men as requires and educates high intellectual faculties of observation, judgment, and speculative imagination. Of that portion of workers who may be said, within limits, to control machinery, there can be no question that the total effect of machinery has been highly educative. Some measure of these educative influences descends even to the "hand" who tends some minute portion of machinery.

2. So also allowance should be made for the skilled work of making and repairing machinery. The engineer's shop is becoming every year a more and more important factor in the equipment of a factory or mill. But though "breakdowns" are essentially erratic and must always afford scope for ingenuity in their repair, even in the engineer's shop there is the same tendency for machinery to undertake all work of repair which can be brought under routine.

3. Finally it should be borne in mind that in several large industries where machinery fills a prominent place the bulk of the labor is not directly governed by the machine. This fact has already received attention in relation to railway workers. The character of the machine certainly impresses itself upon these in different degrees, but in most cases there is a large amount of detailed freedom of action and scope for individual skill and activity.

4. Making allowance, then, for the intelligence and skill used in the invention, application, management, and repair of machinery, what are we to say of the labor of him who, under the minute subdivision enforced by machinery, is obliged to spend his working life in tending some small portion of a single machine, the whole work of which is to push some single commodity a single step along the journey from raw material to consumptive good?

His work, it is urged, calls for "judgment and carefulness." So did

his work in manual labor before the machine took it over. His "judgment and carefulness" are now confined within narrower limits than before. The responsibility of the individual worker is greater, precisely because it is narrowed down so as to be related to and dependent on a number of other operatives in other parts of the same machine with whom he has no direct personal concern. Such realized responsibility is an element in education, moral and intellectual. But this responsibility is a direct result of the minute subdivision. It is, I think, questionable whether the vast majority of machine workers get any considerable education from the fact that the machine in conjunction with which they work represents a huge embodiment of the delicate skill and invention of many thousands of active minds, though some value may be accorded to Mr. Cooke Taylor's contention that "the mere exhibition of the skill displayed and the magnitude of the operations performed in factories can scarcely fail of some educational effect." Professor Shield Nicholson expresses himself more dubiously on the educational value of the machine: "Machinery of itself does not tend to develop the mind as the sea and mountains do, but still it does not necessarily involve deterioration of general mental ability."

The work of tending machinery is not of course to be regarded as absolutely automatic. To a certain limited extent the "tender" of machinery rules as well as serves the machine: in seeing that his portion of the machine works in accurate adjustment to the rest, the qualities of care, judgment, and responsibility are evoked. A great part of modern inventiveness, however, is engaged in devising automatic checks and indicators for the sake of dispensing with human skill and reducing the spontaneous or thoughtful elements of tending machinery to a minimum.

So far as the man follows the machine and has his work determined for him by mechanical necessity, the educative pressure of the latter force must be predominant. Machinery like everything else can only teach what it practices. Order, exactitude, persistence, conformity to unbending law—these are the lessons which must emanate from the machine. They have an important place as elements in the formation of intellectual and moral character. But of themselves they contribute a one-sided and very imperfect education.

5. It is often urged that the tendency of machinery is not merely

to render monotonous the activity of the individual worker, but to reduce the individual differences in workers. This criticism finds expression in the saying: "All men are equal before the machines." So far as machinery actually shifts upon natural forces work which otherwise would tax the muscular energy, it undoubtedly tends to put upon a level workers of different muscular capacity. Moreover, by taking over work which requires great precision of movement, there is a sense in which it is true that machinery tends to reduce the workers to a common level of skill, or even of un-skill.

But this is by no means all that is signified by the "equality of workers before the machine." It is the adaptability of the machine to the weaker muscles and intelligence of women and children that is perhaps the most important factor. The machine in its development tends to give less and less prominence to muscle and high individual skill in the mass of workers, more and more to certain qualities of body and mind which not only differ less widely in different men, but in which women and children are more nearly on a level with men.

It must, I think, be recognized that machinery does exercise a certain equalizing effect by assigning a larger and larger relative importance to those faculties which are specific as compared with those which are individual. The antagonism between machinery and art in this respect is fundamental and irreconcilable. So long and so far as the public continue to sink their individual differences as consumers and employ their expanding powers of purchase in demanding increased quantities of the same kinds of consumptive goods, machinery, with its economic faculty of exact, cheap, and rapid reproduction, will gain an increasing control over the processes of production. When the public becomes more individualistic in its consumption, in demanding greater variety and adaptability to individual taste, instead of immense quantity, this new character of consumption will reduce the advantages enjoyed by machinery, and will operate as an increased demand for art in the sense of individual effort of production.

See also:
"Industrial Accidents and Disease," page 604.
"Unemployment," page 611.
"Hours of Work," page 623.

5. IS MAN MASTER OR SERVANT?[27]

Let me suggest that human beings are instruments of production utilized by machines for the machines' increase and biological development. This is not a new idea. Samuel Butler carried it to the point of suggesting that machines might develop consciousness and thus enslave mankind; Veblen has described how machines train and educate human beings; A. S. Johnson has pointed out how the nominal captain of industry is ruled by the processes he presides over. The economic interpretation of history implies that the machines control human life and organization in its highest forms.

Machines may be conceived as making bargains with man in which they offer him things he very much desires, and in exchange bind him to serve and maintain them, to eliminate the unfit among them and promote their racial progress; they bind him to alter his own social and political arrangements in whatever ways may be necessary in keeping pace with the increasingly complex social organization of the machines themselves, and in keeping the children of man faithful to the service the machines require. The full nature of the terms of these bargains are not revealed to man until he is so fully committed that it is too late to turn back, and thus the machines outwit him.

Some might think this shows a low standard of honesty on the part of the machines, but we must remember that honesty is the morality of equals toward equals, not of superior to inferior races, and that our own conduct toward inferior races will hardly stand a critical examination. At least machines have not forced their culture upon us by armed violence.

The machines appear to have kind intentions toward man, but to lack understanding of many of his feelings and needs; as is frequently the case with ruling and subject races. They have revolutionized both work and product, taking the element of universal individual initiative out of both. They have given man unnatural working conditions which are now leading to incipient revolt, and living conditions that go far to defeat democracy. They are responsible for the "industrial cycle," and as long as their own overhead costs are covered in periods of depression, they have not assumed full responsibility for the corre-

[27] Adapted from John Maurice Clark, "Soundings in Non-Euclidean Economics," *American Economic Review*, XI, No. 1, Supplement (1921), 140–43; and "The Empire of Machines," *Yale Review*, XII (1922), 132–43, by special permission of the editors.

sponding overhead costs of human beings. They have largely taken over the drama without caring to preserve what human beings regard as the highest standards of taste, and they have, intentionally or unintentionally, gone far to undermine the church and even religion itself. They have incontinently switched us from a paternalistic to a laissez-faire type of government and are now busily switching us back again, according to the temporary needs of the stage of development they have reached. These are merely examples.

As for their methods of maintaining control: some classes they bribe with large rewards, other classes, largely technicians and technical scientists, do not need to be bribed: their minds are captured by the material they work in. And the unspecialized "ruling classes," voters or congressmen or others, cannot cope with these specialists, who are left to do more and more of the governing in the shape of the actual working out of things. The ordinary man cannot even speak the dialect in terms of which many of these issues are settled; for example the accounting language used in settling the justice of street-car fares. The machines have cleverly limited human cooperation by splitting human language up into many dialects of many specialist groups, so that the highest common factor of intelligibility, so to speak, for humanity as a whole, consists of relatively simple ideas, largely obsolete in the sense of not actively gripping the newer issues. As men become more dependent on machines, the latter become able to rule by penalties as well as by rewards: for example, our heatless Mondays and other penalties were imposed by failure to develop our railroad system to a continually increasing size and complexity of articulation. Thus mankind moves in directions it never intended, getting largely things it never definitely wanted as the unexpected result of engaging the services of unexpectedly powerful instruments.

I do not advocate revolting against the machines and abolishing or subjugating them: all I aspire to is a reasonable degree of racial equality. This would make for more friendly relations and would help to allay the distrust of the purposes of the machines which now prevents us from getting all the benefits which they are able and willing to give us. We must become far better informed and surer of our own intentions before our dealings with the machines can be characterized by that confidence which marks the bargaining of equals. To attain

this we must not merely develop the ability to rise superior, if necessary, to the immediate bribe that is offered us; we must become competent to bargain, as the machines do, with an intelligent eye to our long-run racial and social interests.

These interests are most seriously threatened in the case of labor. The machines tend to confine discretion in industry to the few whom they take into their confidence, while the bulk of labor has largely lost the power to make any constructive contribution to the technique of industry. The job belongs to the machine, and labor feels little responsibility for it. Labor's state of mind and conduct shows the consequences of this, and many laborers appear to alternate between the slave-morality of getting as much as possible and giving as little, and the spasmodic need of exerting power of some sort. Under the circumstances this can only be power to interfere with the orderly progress of industry by strikes or sabotage, since power to improve on the operations laid down by the machines appears to be beyond labor's present reach, either for lack of competence, ambition, or opportunity. Racial equality can never be established so long as the bulk of mankind are in this position of undignified and passive inferiority.

And what a wonderful race these monstrous beings are! They are powerful, tireless, and accurate. Physical achievements aside, they have already superseded the human mind at many of the routine mental operations of calculating and recording. When a man does not trust his own accuracy, he calls in an adding machine. He sets a recording clock as a sentinel over his workmen, and for detective work uses a cash register or a dictaphone. And when he wants to safeguard funds so that even he himself cannot get at them till the appointed time, he hands his discretion over to a time-lock.

But the more significant qualities of machines are less obvious and are only seen when we look at their social behavior. Their capacity for organization and their moral qualities are little short of marvelous, far transcending the rudimentary intelligence displayed by individual machines, as we are able to observe it. Here, for the first time in history, we have a race of beings devotedly striving, not for selfish indulgence or temporary gratification but for the biological advancement of the race. Not merely that, but they pay other beings to promote their biological development by the most rapid and ruthless se-

lection of the fit. Their bent for specialized cooperation is so strong that it is sometimes difficult to tell whether they are a race of individuals or cells in some single organism. And lastly, they have domesticated man to their service in such shrewd fashion that only a few have been dimly aware of what was happening to us.

And yet it is plain to see, if one will but look. Not merely because the peoples of entire towns are ruled by the whistles of a few factories and rise, eat, go to work, rest, toil, and sleep again at the bidding of these impersonal monitors. Not merely because the throngs of vehicles and pedestrians in the main traffic arteries of New York, Philadelphia, Detroit, and other large cities, must stop and move again at the command of signal lights synchronized from a central station. Such things are exhibitions of gratuitous bravado on the part of the machines, but whistles and lights are not the real rulers of men. More important are the machines that brought these crowded populations together, built our congested cities, and now govern the character of their working life.

Ride through the industrial district stretching from South Chicago to Gary, and as you view the expanse of ugly flats and barrens, ask yourself why these people are here. Is this a place men would choose to live in? Certainly not, if they were free to move out to those blue, wooded hills beckoning in the distance. These people never wanted to live here. But the machines did, and that settled it. If you wish to see who it was that found this site desirable, look yonder at that row of pot-bellied Titans with their grotesquely sprawling limbs, squatting near a feed-trough that looks at least a quarter of a mile in length. Behold, my friends, the only beings who actually wanted to live here, out of a total population of a hundred thousand people and six blast furnaces! The rest are here because the furnaces are here and for no other reason. They either were bribed or came under duress of earning their bread, to this place of dreary flatness.

The things the machines have done to us are so manifold that one hardly knows where to begin; with industry and labor, with the industrial cycle, with art and the drama, language, government, war, crime, science, morals, or religion.

6. THE BRUTE[28]

Through his might men work their wills.
They have boweled out the hills
For food to keep him toiling in the cages they have wrought;
And they fling him, hour by hour,
Limbs of men to give him power;
Brains of men to give him cunning; and for dainties to devour
Children's souls, the little worth; hearts of women, cheaply bought:
He takes them and he breaks them, but he gives them scanty thought.

For about the noisy land,
Roaring, quivering 'neath his hand,
His thoughts brood fierce and sullen or laugh in lust of pride
O'er the stubborn things that he
Breaks to dust and brings to be.
Some he mightily establishes, some flings down utterly.
There is thunder in his stride, nothing ancient can abide,
When he hales the hills together and bridles up the tide.

Quietude and loveliness,
Holy sights that heal and bless,
They are scattered and abolished where his iron hoof is set;
When he splashes through the brae
Silver streams are choked with clay,
When he snorts the bright cliffs crumble and the woods go down like hay;
He lairs in pleasant cities, and the haggard people fret
Squalid 'mid their new-got riches, soot-begrimed and desolate.

They who caught and bound him tight
Laughed exultant at his might,
Saying, "Now behold, the good time comes for the weariest and the least!
We will use this lusty knave:
No more need for men to slave:
We may rise and look about us and have knowledge ere the grave."
But the Brute said in his breast, "Till the mills I grind have ceased,
The riches shall be dust of dust, dry ashes be the feast!

"On the strong and cunning few
Cynic favors I will strew;

[28] Taken by permission from W. V. Moody, *Poems and Plays*, Vol. I, pp. 55–60. (Houghton Mifflin Co., 1912.)

I will stuff their maw with overplus until their spirit dies;
From the patient and the low
I will take the joys they know;
They shall hunger after vanities and still anhungered go.
Madness shall be on the people, ghastly jealousies arise;
Brother's blood shall cry on brother up the dead and empty skies.

"I will burn and dig and hack
Till the heavens suffer lack;
God shall feel a pleasure fail Him, crying to his cherubim,
'Who hath flung yon mud-ball there
Where my world went green and fair?'
I shall laugh and hug me, hearing how his sentinels declare,
' 'Tis the Brute they chained to labor! He has made the bright earth dim.
Store of wares and pelf a plenty, but they got no good of him.' "

So he plotted in his rage:
So he deals it, age by age.
But even as he roared his curse a still small Voice befell;
Lo, a still and pleasant voice bade them none the less rejoice,
For the Brute must bring the good time on; he has no other choice.
He may struggle, sweat and yell, but he knows exceeding well
He must work them out salvation ere they send him back to hell.

All the desert that he made
He must treble bless with shade,
In primal wastes set precious seed of rapture and of pain;
All the strongholds that he built
For the powers of greed and guilt—
He must strew their bastions down the sea and choke their towers with silt;
He must make the temples clean for the gods to come again,
And lift the lordly cities under skies without a strain.

In a very cunning tether
He must lead the tyrant weather;
He must loose the curse of Adam from the worn neck of the race;
He must cast out hate and fear,
Dry away each fruitless tear,
And make the fruitful tears to gush from the deep heart and clear.
He must give each man his portion, each his pride and worthy place;
He must batter down the arrogant and lift the weary face,
On each vile mouth set purity, on each low forehead grace.

Then, perhaps, at the last day,
They will whistle him away,
Lay a hand upon his muzzle in the face of God, and say,
"Honor, Lord, the Thing we tamed!
Let him not be scourged or blamed,
Even through his wrath and fierceness was thy fierce wroth world reclaimed!
Honor Thou thy servants' servant; let thy justice now be shown."
Then the Lord will heed their saying, and the Brute come to his own,
'Twixt the Lion and the Eagle, by the armpost of the Throne.

CHAPTER V

THE PERSONAL FACTOR IN PRODUCTION: LABOR

Purposes of this chapter:

1. To understand the basic elements of the labor force in any economic order.
2. To study the position of the worker in the modern producing system.
3. To grasp the problems involved in securing and maintaining an effective working force.
4. To sense the significance of the conservation of human energy and to note some of the methods by which it may be accomplished.

Thus far in the discussion of our producing activities we have canvassed the part played by natural resources (earth features and earth resources), and the part played by culture in both its non-physical and its physical aspects. We turn now to the personal factor in production, devoting this chapter to labor and the following chapter to enterprise and management.

This current chapter by no means attempts to cope with all the issues connected with "labor" in our economic order; a very considerable number of these issues are postponed to Part III, where a discussion of the labor market is a part of the treatment of the larger topic, the co-ordination of specialists in our society. At the present time our point of view is confined to seeing labor in the productive process. This arbitrary division of the discussion of labor is, like all such classifications, somewhat unreal and can be justified only as a method of exposition.

We begin by reflecting upon the component parts of "the labor force" of any economic order and especially by getting a fairly clear understanding of the composition of the labor force of our own country today. Of course, our labor force operates in the main under a

wage system. The advantages and disadvantages to labor of our type of economic organization will be surveyed, and a view will be had of the institutional life which has come into existence in this connection. Since the greater part of our labor force works in business units (even a governmental bureau or a philanthropic establishment may be regarded as a business unit for this purpose) we shall need to know the conditions of effective performance under such circumstances. A discussion of conservation—wise utilization—of human energy ends the chapter.

A. Present-Day Workers

No one should be a slave to definitions, but it will facilitate discussion if we are reasonably clear concerning what we mean by labor.

To begin with, labor, as the term is here used, does not include the effort of animals, such as horses or oxen; that effort is regarded as a service flowing from one type of capital goods. So also, and for the same reason, labor does not refer to the services of machines or tools. Labor, as here discussed, has reference only to the effort of free human beings, and not even to all such effort. The effort of a person engaging in a game for the game's sake is play. Only human effort that is undertaken, not as an end in itself, but as a means to an end—usually in the expectation of remuneration—is labor.

Labor even thus defined is a broad term. It includes independent workers who "work for themselves," and also dependent workers who "work for others." In the present chapter, however, we confine our attention to those "dependent workers" who "work for others" under the operations of the wage system. It is to be noticed that even as regards this group, the labor of managerial workers is treated in the following chapter.

Our first task is that of ascertaining the elements of labor force, as thus defined. The labor force of a given area depends in part upon the size of the population, in part upon the age and sex distribution of this population, in part upon the powers of the individual members of the population, and in part upon the will-to-do of these members—upon these and other factors.

Concrete evidence concerning the component parts of our own labor force and concerning its distribution into various occupations is, fortunately, available in the data from our census.

The following pages will be examined with greater profit if these issues[1] are kept in mind.

1. What part (considered both proportionally and in absolute numbers) of our population is gainfully employed?
2. What proportion of the gainfully employed are wage-earners?
3. What part is played by women in our labor force?
4. What significant shifts have occurred in our labor force in the last two generations?
5. Under what circumstances and conditions may we expect the individual workman to be efficient?

1. SOME DEFINITIONS OF LABOR

"Labor is a wealth-creating effort. . . . ."—J. B. Clark, *Essentials of Economic Theory,* chap. i.

"The term labor . . . . includes all human exertion. . . . ." —Henry George, *Progress and Poverty,* Book I, chap. ii.

"Labor is any human effort having an aim or purpose outside of itself."—F. A. Fetter, *The Principles of Economics,* chap. xx.

"Labor is the application of human faculties to the production of wealth."—A. S. Johnson, *Introduction to Economics,* chap. x.

"Labor is the voluntary exertion of bodily or mental faculties for the purpose of production."—N. W. Senior, *Political Economy.*

"We may define labor as any exertion of mind or body undergone partly or wholly with a view to some good other than the pleasure derived directly from the work."—Alfred Marshall, *Principles of Economics,* Book II, chap. iii.

"Labor may be properly defined as any sort of action or operation, whether performed by man, the lower animals, machinery, or natural agents, that tends to bring about any desirable result."—J. R. M'Culloch, Supplemental Note I to Smith's *Wealth of Nations.*

"Labor. 1. Exertion of the faculties of the body or mind, especially when painful or compulsory; bodily or mental toil.

"2. Physical exertion directed to the supply of the material wants of the community; the specific service rendered to production by the laborer and artisan."—Murray, *New English Dictionary.*

[1] A more detailed statement of issues may be found in *Outlines of the Economic Order,* pp. 120–23. (The University of Chicago Press.)

"Labor is . . . . a process in which both man and Nature participate, and in which man of his own accord starts, regulates, and controls the material reactions between himself and Nature. He opposes himself to Nature as one of her own forces, setting in motion arms and legs, head and hands, the natural forces of his body, in order to appropriate Nature's productions in a form adapted to his own wants."—Karl Marx, *Capital* (Engel's translation), Vol. I, chap. vii.

"Labor is either bodily or mental; or, to express the distinction more comprehensively, either muscular or nervous; and it is necessary to include in the idea, not solely the exertion itself, but all feelings of a disagreeable kind, all bodily inconvenience or mental annoyance, connected with the employment of one's thoughts, or muscles, or both, in a particular occupation. . . . .

"Labor . . . . in the physical world, is always and solely employed in setting objects in motion; the properties of matter, the laws of nature, do the rest."—John Stuart Mill, *Principles of Political Economy*, Book I, chap. i.

2. THE WAGE-EARNING CLASS[1a]

We now have a fairly permanent wage-earning class, forming a large proportion of the population, engaged in many occupations, and including many women and children.

In the colonies almost every worker either was his own master or expected to become a master craftsman, farmer, or merchant: to be independent of employment by other men. Today there are still independent employers, farmers, and merchants, but in contrast with colonial times the great majority of workers are employed by others. They do not own the tools with which they work, have minor control over the hours and conditions of their work, and are not responsible for the management of the plant in which they are employed. These workers receive wages in return for their work and are called wage-earners.

Who are the wage-earners and how big a group do they form?—The proportion of the persons gainfully occupied, by which we mean engaged in an occupation for profit or wages, who are included in the wage-earning class has grown rapidly in the last fifty years. From the figures on the following page we can see that over one-half of the gain-

[1a] Prepared by Mildred J. Wiese.

fully employed persons in this country now may be included in the wage-earning class. In making this table three classes of persons were included among the proprietary and independent workers, and four

NUMBER OF WORKERS IN DESIGNATED CLASSES IN THE UNITED STATES IN 1870 TO 1920*

Groups	1870	1880	1890	1900	1910	1920
Farm laborers...	2,885,996	3,323,876	3,004,061	4,410,877	6,143,998	4,178,637
Farmers........	3,000,229	4,282,074	5,380,181	5,770,738	6,229,161	6,463,708
Proprietors and officials.......	581,378	807,049	1,347,329	1,811,715	2,879,023	3,168,418
Professional.....	414,708	666,338	1,114,507	1,565,686	2,074,792	2,760,190
Lower salaried..	309,413	529,473	965,852	1,329,928	2,393,620	3,985,306
Servants........	975,734	1,075,655	1,454,791	1,453,677	1,572,225	1,270,946
Industrial wage-earners.......	3,328,351	5,286,829	7,360,442	10,263,569	14,556,979	17,648,072
Unclassified.....	1,019,114	1,420,795	2,118,498	2,467,043	2,317,538	2,138,971
Total......	12,505,923	17,392,099	22,735,661	29,073,233	38,167,336	41,614,248

* Tables compiled and plan of analysis worked out by Alvin H. Hansen "Industrial Class Alignments in the United States," *American Statistical Association Quarterly*, December, 1922, p. 504.

THE PROPORTION OF WORKERS IN DESIGNATED CLASSES IN THE UNITED STATES: 1870 TO 1920*

Groups	1870	1880	1890	1900	1910	1920
Farm laborers...............	23.1%	19.1%	13.2%	15.2%	16.1%	10.0%
Farmers.....................	24.0	24.6	23.6	19.8	16.3	15.5
Proprietors and officials.....	4.6	4.6	5.9	6.2	7.5	7.6
Professional.................	3.3	3.8	4.9	5.4	5.4	6.6
Lower salaried..............	2.5	3.0	4.3	4.6	6.3	9.6
Servants....................	7.8	6.2	6.4	5.0	4.1	3.1
Industrial wage-earners.......	26.6	30.4	32.4	35.3	38.2	42.4
Unclassified................	8.1	8.2	9.3	8.5	6.0	5.1
Total proprietary and independent...........	44.3	43.3	41.5	39.6	37.9	34.3
Wage-workers...........	47.6	48.6	49.2	51.9	56.0	60.5
Unclassified.............	8.1	8.2	9.3	8.5	6.0	5.1

* Tables compiled by Alvin H. Hansen, "Industrial Class Alignments in the United States," *American Statistical Association Quarterly*, December, 1922, p. 504.

among the wage-earners. Included in the proprietary and independent workers are (1) farmers, (2) proprietors and officials, and (3) the professional class. "Farmers" include farm-owners, tenants, and children of the farmers. "Proprietors and officials" include such workers as manufacturers; proprietors; superintendents; mining operators; mechanical engineers; bankers; brokers; real estate and insur-

ance agents; commercial travelers; merchants and dealers at retail and wholesale; auctioneers; jewelers (not workers); garage-keepers; restaurant and hotel-keepers; and officials and managers in any business enterprise. The professional class includes not only doctors, lawyers, teachers, and similar groups regularly referred to as professional, but also untrained nurses and such public-service groups as detectives, sheriffs, marshals, policemen, government officials, soldiers, sailors, and marines, and life-savers.

Among the wage-earners are included (1) farm laborers, (not including children of farmers), (2) industrial wage-earners, (3) lower-salaried employees, and (4) servants. "Industrial wage-earners" include all wage-earners except servants, farm laborers, and that portion of the wage-earning class which falls for lack of clear census designation into the unclassified group. Clerks and copyists, foremen and overseers, stenographers and typists, bookkeepers and accountants, agents and collectors, inspectors and samplers, demonstrators, sales agents, ticket and station agents, express agents, baggagemen and freight agents, mail carriers, chauffeurs, housekeepers, and stewards have all been grouped together under the designation "lower-salaried employees."

The wage-earning class has formed an increasingly large proportion of our gainfully employed population growing from 47.6 per cent to 60 per cent in fifty years. The figure for 1920 might be even larger if the 1920 census had not been taken in January when the number of farm laborers is reduced to a minimum. Judging from these figures there can be no doubt that the wage-earners are an exceedingly important part of our gainfully employed population.

A classification of workers gives interesting information.—Another classification may be worked out from the percentage table. Farm laborers and farmers together in 1920 formed only about one-fourth of the gainfully occupied population, the former group being somewhat smaller than the latter. Proprietors and officials although a steadily increasing group since 1870 included only 7.6 per cent of the total in 1920. The professional class composes 6.6 per cent of the total number engaged in gainful occupations, or a little less than one in fifteen. Domestic and personal servants have since 1870 formed a de-

creasing proportion of the population engaged in gainful occupations, being the smallest group in 1920 with 3.1 per cent. The number and

CHANGES IN THE PROPORTION OF WOMEN GAINFULLY EMPLOYED IN THE UNITED STATES BETWEEN 1880 AND 1920*

Year	Percentage of Total Number of Women	Number of Women Gainfully Employed
1880	14.7	2,647,000
1890	14.4	4,005,000
1900	18.8	5,319,000
1910	23.4	8,076,000
1920	21.1	8,549,000

* *Fourteenth Census of the United States, Abstract of Occupation Statistics* (1923), p. 481. The apparent decrease in the percentage of women gainfully employed in 1920 is not wholly a real decrease. Owing to a change in the method of taking the census in 1910 the number for that year is greatly exaggerated. About 1,000,000 too many women working on farms were included as gainfully employed in that year but do not appear in the other census figures.

OCCUPATIONS IN WHICH WOMEN EMPLOYED EXCEED MEN, 1920*

Occupation	Number of Women	Number of Men
School teachers	635,207	116,848
Stenographers and typists	564,744	50,410
Launderers and laundresses not in laundries	385,874	10,882
Clothing factory operatives	265,643	143,718
Dressmakers and seamstresses not in factories	235,519	336
Housekeepers and stewards	204,350	17,262
Telephone operators	178,379	11,781
Trained nurses	143,664	5,464
Boarding and lodging-house keepers	114,740	18,652
Cigar and tobacco factory operatives	83,960	61,262
Knitting mill operatives	80,682	26,922
Silk mill operatives	72,768	42,953
Musicians and teachers of music	72,678	57,587
Candy, factory operatives	31,368	20,913
Religious, charity and welfare workers	26,927	14,151
Paper box factory operatives	13,375	7,077
Librarians	13,502	1,795
Lace and embroidery mill operatives	12,997	6,086

* *Fourteenth Census of the United States* (1920), Vol. IV, *Occupations*, pp. 35–43.

proportion of lower-salaried employees has grown fairly rapidly, forming, in 1920, 9.6 per cent of all workers. By far the largest group was that of industrial wage-earners. Forty-two and four-tenths per cent or well over two-fifths of the total number of gainfully occupied

people in this country were in this class. This, in itself, would be sufficient reason for giving special attention to the industrial wage-earner in a study of the worker in our society.

Women and children form an important part of the wage-earning class.—Before the industrial and economic revolution there were few occupations outside of domestic service open to women seeking gainful employment. Most women found plenty of work in the home, and their work there was a very necessary contribution to the livelihood of the family. With the growth of machine industry, of large-scale production, and the great increase in specialization, more and more of the tasks formerly carried on in the home have been taken over by factories. Women no longer use the home as a place to spin cotton and flax and weave clothing. In many, many homes the women do not bake the bread or can the fruits and vegetables needed by the family. Great factories provide ready-made clothing, laundries and cleaning establishments keep our clothes and linens clean, bakers provide bread and cake, canneries provide fruits, vegetables, and ready-cooked fish and meats, and at times the delicatessen store, restaurant, or hotel provides the entire meal. Many of these tasks can be performed more efficiently and cheaply outside

OCCUPATIONS EMPLOYING LARGEST NUMBER OF WOMEN WORKERS, 1920[2]

Servants[3]	1,012,133
Farm laborers[4]	792,915
Teachers	639,241
Stenographers and typists	564,744
Clerks (except in stores)	472,163
Laundresses (not in laundries	385,874
Saleswomen[5]	361,142
Bookkeepers, cashiers, and accountants	359,124
Clothing factory operatives	265,643
Farmers	253,836
Dressmakers (not in factories)	235,519
Housekeepers and stewardesses	204,350
Telephone operators	178,379
Clerks in stores	170,397
Cotton-mill operatives	149,185
Trained nurses	143,664
Nurses, not trained	132,658
Waitresses	116,921
Boarding- and lodging-house keepers	114,740
Total	6,552,669

[2] From *Fourteenth Census of the United States, 1920,* Vol. IV, *Occupations,* pp. 35–43.

[3] Includes 268,618 cooks.

[4] Includes 576,642 on home farm.

[5] Includes 356,321 in stores.

the home. Women, particularly in cities, do not need to work so hard in the home as their grandmothers did. But the tasks which grandmother performed must be accomplished today even if they are not carried on in the home, and when they are done outside the home they must be paid for. It is not surprising to find a steady increase in the number of women who have followed their work from the home into the factories and mills. Where formerly home duties required all the time of mother, daughters, and perhaps a servant or two, now the mother frequently bears the burden of the home alone, and the daughters and former servants may be found in offices and factories. Of the 40.5 million of women and girls in the United States some 8.5 million, or more than one-fifth of the total, are gainfully employed, and the proportion of those gainfully employed has increased from 14.7 cent in 1880 to 21.1 in 1920.

Not only have women followed the work formerly done in the home to the factory but children, too, are employed in large numbers. Machine industry and minute specialization have created simple tasks which children can perform, and the wages they receive often are a

PROPORTION OF CHILDREN GAINFULLY EMPLOYED IN THE UNITED STATES, 1920*

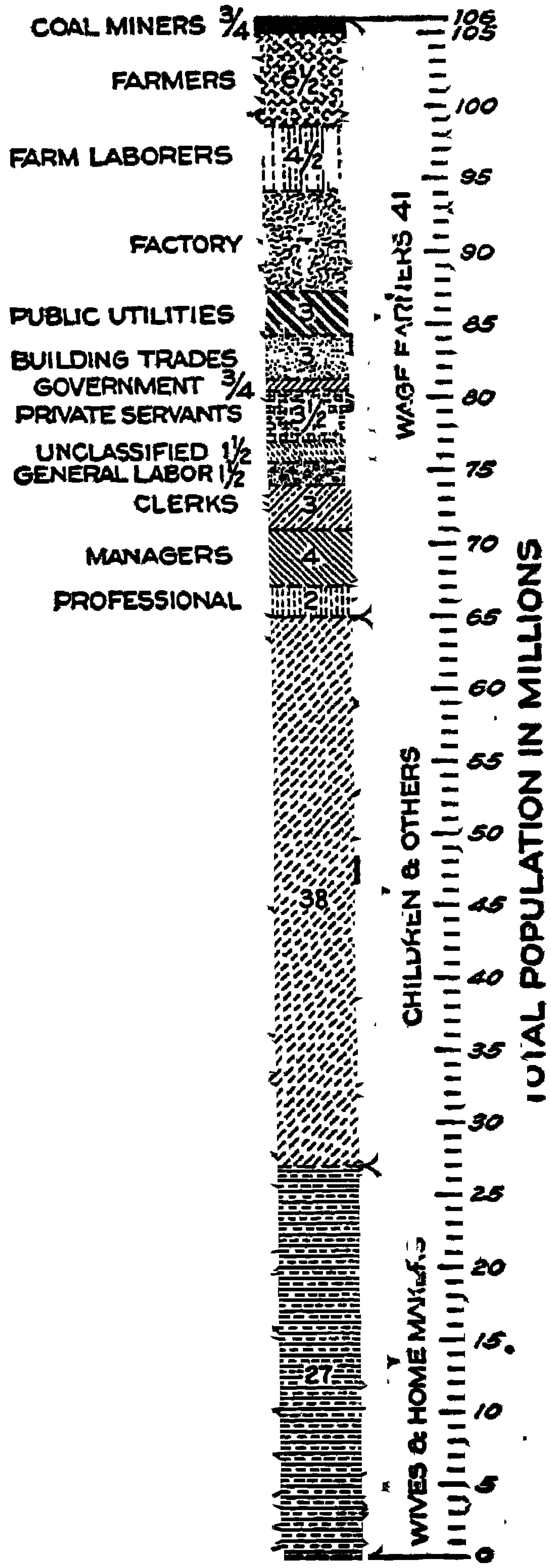
	Absolute Number	Number Gainfully Employed	Percentage Gainfully Employed
Children between 10 and 15 years of age	12,502,582	1,060,858	8.5
Boys between 10 and 15 years of age	6,294,985	714,248	11.3
Girls between 10 and 15 years of age	6,207,597	346,610	5.6

* *Abstract of Occupation Statistics* (1920), p. 534.

grateful addition to the family income. The census figures show the number of children ten years of age or over gainfully employed. This will give us a fairly accurate picture of the total number of children at work for there are not many at work under ten years of age. In all but five states children under fourteen years are prohibited by law from being employed in general factory work, and all states forbid employment of children in certain kinds of work. In spite of the fact that there has been much agitation against child labor, and that many

states have laws against it, there are still well over a million children under fifteen years of age gainfully employed in the United States. Some conservative writers say there are two million gainfully employed.

The figures in the table on the foregoing page (the Census Bureau in January, 1920) do not include as gainfully occupied many children who work on farms during the greater part of the year, since in January there is little work to do on farms and most of these young farmers are at school. Also, of course, the census could not include children gainfully occupied in violation of the law, for example those claiming to be above the legal age limit, and young children helping their parents in home occupations, such as making artificial flowers, boxes, and similar products. Undoubtedly the stricter enforcement of child-labor laws, and the enactment of new laws against child labor, as well as the more efficient enforcement of compulsory school attendance laws, have been important factors in decreasing the number of children thus illegally at work. Several attempts have been made to secure federal legislation against child labor but these have been declared unconstitutional.



Courtesy of S. S. Wyer

THE OCCUPATIONAL GROUPS IN THE UNITED STATES (IN MILLIONS)

The changes brought about in the course of the development of modern industrial organization have given rise to problems of importance to all workers, but in each group of problems which have arisen

OCCUPATIONAL DISTRIBUTION

I. Number and Proportion of Persons Gainfully Employed in the United States, 1880–1920

Year	Number of Persons 10 Years of Age and Over Gainfully Employed	Number of Males 10 Years of Age and Over	Number of Females 10 Years of Age and Over	Percentage These Persons Are of Population Which Is 10 Years of Age and Over	Percentage These Males Are of Total Male Population 10 Years of Age and Over	Percentage These Females Are of Total Female Population 10 Years of Age and Over
1880	17,392,099	14,744,942	2,647,157	47.3	78.7	14.7
1890	23,318,183	19,312,652	4,005,531	49.2	79.3	17.4
1900	29,073,233	23,753,836	5,319,397	50.2	80 0	18.8
1910	38,167,336	30,091,564	8,075,772	53.3	81.3	23.4
1920	41,614,248	33,064,737	8,549,511	50.3	78.3	21.1

II. Total Persons Ten Years of Age and Over Engaged in Gainful Occupations, 1920

Occupations	Number	Per Cent	Per Cent	
			Males	Females
All occupations	41,614,248	100.0	100.0	100.0
Agriculture, forestry, and animal husbandry	10,953,158	26.3	29.8	12.7
Extraction of minerals	1,090,223	2.6	3.3	*
Manufacturing and mechanical industries	12,818,524	30.8	32.9	22.6
Transportation	3,063,582	7.4	8.6	2.5
Trade	4,242,979	10.2	10.8	7.8
Public service (not elsewhere classified)	770,460	1.9	2.3	0.3
Professional service	2,143,289	5 2	3.4	11.9
Domestic and personal service	3,404,892	8.2	3.7	25.6
Clerical occupations	3,126,541	7.5	5.1	16.7

* Less than 0.1 of 1 per cent.

III. Per Cent Distribution by Sex of the Persons in Each General Division of Occupations, 1920

Division of Occupation	Males Per Cent	Females Per Cent	All Per Cent
All occupations	79.5	20.5	100.0
Agriculture, forestry, and animal husbandry	90.1	9.9	100.0
Extraction of minerals	99.7	0.3	100.0
Manufacturing and mechanical industries	84.9	15.1	100.0
Transportation	93.0	7.0	100.0
Trade	84.3	15.7	100.0
Public service (not elsewhere classified)	97.2	2.8	100.0
Professional service	52.6	47.4	100.0
Domestic and personal service	35.8	64.2	100.0
Clerical occupations	54.4	45.6	100.0

those of the wage-earner seem most difficult of solution. One reason for this may be that a separate wage-earning class is really quite new in this country. Until comparatively recently workers who could not rise in the industry in which they were employed could easily go west to the open frontier or could find opportunity in opening a small business for themselves. The wage-earning class was constantly changing. This is no longer entirely true. In recent years, as the frontier closed and large scale business developed, a more permanent class of wage-earners has come into existence. Grievances such as loss of control over wages, hours, or working conditions, monotony, lack of independence, and loss of skill, did not seem particularly serious to the worker who could expect to leave his irksome job and become manager or owner of his own business or farm. To the wage-earner who can see no better future before him such grievances assume gigantic proportions.

3. THE IMMIGRANT AND THE NEGRO IN OUR POPULATION[6]

In the population of the United States today there are representatives of almost every race and nation of the world. The colonies were English and most of their inhabitants came from England. It is believed that in 1790 over four-fifths of the people were English and the remainder were Scotch, German, Dutch, Irish or French. To this original colonial stock there has been added by immigration the peoples of many lands. The earlier immigrants came almost entirely from northwestern Europe, from Great Britain, Germany and the Scandinavian countries. They included many skilled craftsmen as well as many hardy farming pioneers and they included also unskilled workers, especially the "pick and shovel brigade" of the Irish. Since about 1880, however, there has been a great change in the source of our immigration. In 1882, 87 per cent of our immigrants were from northern and western Europe; 13 per cent from southern and eastern Europe. By 1907, the proportion had changed to 81 per cent from southern and eastern Europe and but 19 per cent from northwestern Europe. This "newer immigration" includes Italians, Greeks, Poles, Russians and other Slavs from middle and southeastern Europe. They have done

[6] Adapted from Wiese and Reticker, *The Modern Worker* (1929). Reprinted by permission of The Macmillan Company, publishers.

work in coal mines, in iron and steel industries, in packing plants, and in other large scale manufactures.

Immigration at present shows a great decrease because Congress has passed laws limiting the number of European immigrants who may enter each year to 150,000 in order that those already here may be assimilated into a unified nation. Each nation's proportion of the 150,000 is determined by the "national origin" of our present population. In consequence, Germany, Great Britain and the Scandinavian countries once more furnish the largest number of our new citizens

IMMIGRATION TO THE UNITED STATES, 1820 TO 1920, BY DECADES

Period	Immigrants	Percentage of Distribution by Decades	Average per Year
1820–30..........	151,824	0.4	13,802
1831–40..........	599,125	1.7	59,913
1841–50..........	1,713,251	5.1	171,325
1851–60..........	2,598,214	7.7	259,821
1861–70..........	2,314,824	6.8	231,482
1871–80..........	2,812,191	8.3	281,219
1881–90..........	5,246,613	15.5	524,661
1891–1900........	3,687,564	10.9	368,756
1901–10..........	8,795,386	26.1	879,539
1911–20..........	5,735,811	17.0	573,581
Total........	33,654,803	100.0	333,215

from Europe. As for immigration from Asia, it has practically been eliminated. No restriction has been placed on immigration from Canada, Mexico, and South America, Cuba and other West Indian Islands, and people from these countries now make up a large proportion of our total entrants. The demand of some industries for unskilled labor is now being met by Mexicans instead of Italians and Poles.

A recent study on immigration[7] points out that there are at the present time in this country over 45,000,000 descendants of the original colonial stock—well over one-third of the total population. In 1920 our total population was made up of 76.7 per cent native born white (which would include many "first generation American," the native born of foreign parentage); 13 per cent foreign born whites; and 9.9 per cent negroes. Thus one in every ten persons is colored;

[7] Niles Carpenter, *Immigrants and Their Children, 1920,* p. 4. (U.S. Department of Commerce, 1927.)

one in every eight is foreign born; two out of three are descendants of other than the original colonial stock.

In 1920 the Negro population of the United States numbered 10,463,131.[8] This represented a 10-year increase of 635,000, or 6.5 per cent, the lowest thus far recorded. In consequence of this slow numerical progress the proportion formed by Negroes in the total population declined from 10.7 per cent in 1910 to 9.9 per cent in 1920. The highest proportion, 19.3 per cent, was recorded in 1790.

The following table throws some light on the distribution of the Negro population at different periods of American history:

NEGRO POPULATION

Census Year	Percentage in Southern States	Percentage Native Remaining in State of Birth	Percentage Urban	Percentage Rural
1890......	90.3	*85.2	19.8	80.2
1900......	89.7	84.4	22.7	77.3
1910......	89.0	83.4	27.4	72.6
1920......	85.2	80.1	34.0	66.0

* Relates to total colored population, including Indian, Chinese, and Japanese.

4. OCCUPATIONS IN MANUFACTURING

SKILLED WORKERS BY TRADES, 1920[9]

Bakers	97,940
Blacksmiths, forgemen and hammermen	221,421
Boiler makers	74,088
Brick and stone masons	131,264
Builders and building contractors	90,109
Cabinetmakers	45,511
Carpenters	887,379
Compositors, linotypers and typesetters	140,165
Coopers	19,066
Dressmakers and seamstresses (not in factory)	235,855
Dyers	15,109
Electricians	212,964
Electrotypers, stereotypers and lithographers	13,716
Engineers (stationary), cranemen, hoistmen, etc.	279,984
Engravers	15,053
Filers, grinders, buffers, and polishers (metal)	59,785
Firemen (except locomotive and fire department)	143,875
Foremen and overseers (manufacturing)	307,413
Furnacemen, smeltermen, heaters, pourers, etc.	40,806
Glass blowers	9,144

[8] Adapted from William S. Rossiter, *Census Monograph I*, "Increase of Population in the United States, 1910–1920." (Government Printing Office, 1922.)

[9] *Fourteenth Census of the United States, 1920*, Vol. IV, *Occupations*, pp. 35–39.

Jewelers, watchmakers, goldsmiths and silversmiths	39,592
Loom fixers	15,961
Machinists, millwrights and toolmakers	894,662
Managers and superintendents (manufacturing)	201,721
Manufacturers and officials	231,615
Mechanics (not otherwise specified)	281,741
Millers (grain, flour, feed, etc.)	23,272
Milliners and millinery dealers	73,255
Molders, founders, and casters (metal)	123,681
Oilers of machinery	24,612
Painters, glaziers, varnishers, enamelers, etc.	323,032
Paper hangers	18,746
Pattern and model makers	27,720
Plasterers and cement finishers	45,876
Plumbers and gas and steam fitters	206,718
Pressmen and plate printers (printing)	18,683
Rollers and roll hands (metal)	25,061
Roofers and slaters	11,378
Sawyers	33,809
Shoemakers and cobblers (not in factory)	78,859
Skilled occupations (not otherwise specified)	19,395
Stonecutters	22,099
Structural iron workers (building)	18,836
Tailors and tailoresses	192,232
Tinsmiths and coppersmiths	74,968
Upholsterers	29,605
Apprentices to building and hand trades	79,953
Apprentices to dressmakers and milliners	4,326
Apprentices to other	65,898
Total skilled workers and apprentices in manufacturing and mechanical industries	6,241,923

The number of semiskilled workers in manufacturing was placed at 3,686,301; the number of laborers at 2,877,092.

5. THE PROFESSIONAL GROUP

It must be admitted that no one knows exactly what we mean by the term professional workers. It certainly includes persons who *render services* rather than *make things;* it usually implies that training is necessary to perform the task well; it is usually thought to refer to persons who are not content merely to make money but strive in some definite way for the betterment of mankind; and it is sometimes used as if a "professional" person were a person of high school standing.

Whatever the term may mean, a fairly good impression of the relative importance of the various professional ties may be seen from the accompanying tabulation. Homemakers head the list; then come, in order, teachers, medical workers, entertainers and artists, engineers, clergymen, lawyers, social workers, writers, and others. It does not

take much imagination to see in this list relief from pain, inspiration to better living, increased knowledge, and growing mastery of nature.

The way this work is divided up between men and women is very

PROFESSIONAL WORKERS WHO GIVE SERVICE THAT PEOPLE USE DIRECTLY FOR THEIR OWN ENJOYMENT OR IMPROVEMENT[10]

	Total	Male	Female
Medical workers	368,781	214,405	154,376
Physicians and surgeons	144,977	137,758	7,219
Dentists	56,152	54,323	1,829
Osteopaths	5,030	3,367	1,663
Trained nurses	149,128	5,464	143,664
Veterinary surgeons	13,494	13,493	1
Social workers	41,078	14,151	26,927
Clergymen	127,270	125,483	1,787
College presidents and professors	33,407	23,332	10,075
Teachers	761,766	122,525	639,241
Librarians	15,297	1,795	13,502
Writers	40,865	32,129	8,736
Authors	6,668	3,662	3,006
Editors and reporters	34,197	28,467	5,730
Entertainers and artists	248,098	139,330	108,768
Actors and showmen	48,172	33,818	14,354
Painters, sculptors, and teachers of art	35,402	20,785	14,617
Musicians and teachers of music	130,265	57,587	72,678
Photographers	34,259	27,140	7,119
Home-makers	21,318,933	....	21,318,933

PROFESSIONAL WORKERS CONCERNED MOSTLY WITH HELPING THE BUSINESS MAN IN SOME OF HIS TASKS

	Total	Male	Female
Engineering professions	239,713	230,294	9,419
Engineers	136,121	136,080	41
Designers	15,410	9,758	5,652
Draftsmen	52,865	50,880	1,985
Inventors	2,376	2,349	27
Chemists, assayists, and metallurgists	32,941	31,227	1,714
Architects*	18,185	18,048	137
Lawyers*	122,519	120,781	1,738
Public accountants, about	6,000	....	†

* Do much work also directly for people not in business.

† Only a few.

[10] L. S. Lyon, *Making a Living*, pp. 340–41. (The Macmillan Company, 1926.)

interesting. Our doctors, our clergymen, our college professors, our editors, our engineers, our architects, our lawyers, and our accountants are mostly men. On the other hand, our trained nurses, our social workers, our public-school teachers, our librarians, and of course our home-makers are mostly women. Occupations in which the sexes are fairly well balanced are not numerous; the entertainers and artists and the authors are about the only really good cases of an even balance.

6. MOST WORKERS ARE IN LARGE ESTABLISHMENTS[11]

In 1925 there were five manufacturing industries which, the country over, employed more than 300,000 workers each; these will be examined in turn. (1) By far the largest number of establishments in *lumber and timber products* are small scale, more than three quarters of them so small that their output was less than $100,000 each in 1925. These many small establishments, however, employed but 15 per cent of the 473,998 workers in the industry; whereas the 3 per cent of the plants which each had a product of a million dollars or more employed 38 per cent of the wage earners. (2) The 8,154 *foundries* are also typically small scale, 61 per cent being in the less than $100,000 group. But these many small foundries employ only 10 per cent of the wage earners in the industry; whereas 48 per cent are employed in large groups in the few foundries with over a million dollar output. (3) The establishments for *general construction and repairs of railroad cars* (1,842 plants) and for the manufacture of (4) *cotton goods* (1,366 plants) are predominately "middle sized." Yet 66 per cent of the wage earners in construction and repairs of steam railways and 77 per cent in cotton goods manufacture are in large groups in a small number of the larger establishments. (5) *Steel works and rolling mills* are predominately large scale with 66 per cent of the establishments producing more than a million dollars worth of goods per establishment per year and employing more than 99 per cent of the workers. So far as these industries are concerned—and they are significant because the country over they employ larger numbers than do other industries—the census figures justify the statement that industry still op-

[11] Adapted from Wiese and Reticker, *The Modern Worker* (1929). Reprinted by permission of The Macmillan Company, publishers.

erates on all scales—large, medium and small—but even in the industries which have many small establishments, the majority of workers are in the large establishments working together in large groups.

INDUSTRIES, IN WHICH AT LEAST NINE-TENTHS OF THE WORKERS ARE IN LARGE GROUPS IN ESTABLISHMENTS WITH ANNUAL PRODUCTS OF $1,000,000 OR MORE, 1925*

	I Total Number of Establishments†	II Total Number of Wage Earners‡	III Number of Large Scale Establishments§	IV Percentage of Large Scale Establishments	V Percentage of Wage Earners in Large Scale Establishments	VI Average Number of Wage Earners in Large Scale Establishments
Sugar refining	21	14,502	21	100	100	690
Smelting and refining copper	26	15,588	26	100	100	600
Smelting and refining lead	17	6,115	17	100	100	360
Rubber boots and shoes	23	24,999	19	83	99	1,300
Rayon	14	19,128	9	64	99	2,100
Motor vehicles	297	197,728	133	45	98	1,450
Locomotives	18	12,809	8	44	98	1,570
Smelting and refining zinc	28	11,289	24	85	98	460
Blast furnaces	122	29,188	105	86	98	270
Petroleum refining	359	65,324	224	62	97	285
Rubber tires and tubes	126	81,640	69	54	96	1,145
Steel works and rolling mills	473	370,726	317	67	95	1,120
Watches	13	13,915	7	54	95	1,890
Slaughtering and meat packing	1,269	120,422	329	26	92	335
Wool carpets and rugs	69	33,886	34	49	92	920
Cement	145	38,437	101	70	91	345
Motor vehicles, bodies and parts	1,358	228,382	148	11	91	1,280
Electric and steam railway cars	141	50,393	60	42	90	755

* Compiled from figures in *Biennial Census of Manufactures: 1925, Size of Establishments by Value of Product*, pp. 1222–1233.

† The census explains that "as a rule, the term 'establishment' signifies a single plant or factory. In some cases, however, it refers to two or more plants operated under a common ownership and located in the same city or state."

‡ The number of workers given is the average number for the year, secured by averaging the number of wage earners on the fifteenth of each month.

§ In columns III to VI, "large scale" refers to establishments with an annual product of a million dollars or more.

The table given above shows the industries in which at least nine-tenths of the workers are employed in establishments producing a yearly product of a million dollars or more. The list includes some

large products and some small products, many "ne
many industries in which chemical methods are im
Conspicuous among the new industries are *mo*
most 200,000 workers, 98 per cent of whom work
factories, averaging 1,450 employees each; *rubber*

MANUFACTURES: CLASSIFIED ACCORDING
ESTABLISHMENT AS MEASURED BY THE
PRODUCTS, 1909, 1914, 1919, AND 19

Value of Product and Year	I Establishments: Percentage of Total	II Products: Percentage of Total	III
Less than $5,000:			
1909	34.8	1.1	
1914	*	*	
1919	*	*	
1925	*	*	
$5,000 and less than $20,000:			
1909	32.4	4.4	7.1
1914	49.0	3.7	6.1
1919	37.2	1.4	2.5
1925	29.8	1.0	1.9
$20,000 and less than $100,000:			
1909	21.3	12.3	16.5
1914	31.9	10.6	14.4
1919	35.3	5.6	8.6
1925	36.8	5.2	7.9
$100,000 and less than $1,000,000:			
1909	10.4	38.4	43.8
1914	16.9	36.5	43.5
1919	22.7	24.8	31.4
1925	27.7	26.3	33.5
$1,000,000 and over:			
1909	1.1	43.8	30.5
1914	2 1	49.2	35.9
1919	4.8	68.2	57.5
1925	5.6	67.6	56.8

* Establishments with a product of less than $5,000 a year were not enumerated in 1925, and have been omitted from the tables for 1914 and 1919. That means that the figures in column I for 1909 are not comparable with the figures for later years. The figures in columns II and III are very slightly affected since the proportion of product and of wage earners in establishments of the less than $5,000 group are seen to be such a small percentage of the total.

per cent of its 81,640 employees in 69 large scale factories averaging 1,145 employees, and *motor vehicle bodies and parts,* employing 87 per cent of its almost 200,000 workers in 148 large scale factories (only 11 per cent of the total number of establishments) averaging 1,280 workers. Partly stimulated by the growth of the automobile are other rapidly growing industries; *petroleum refining* and *cement manufacture,* employing respectively 97 and 90 per cent of their workers

[illegible] scale establishments. In both these cases, the million dollar [illegible] represents a larger proportional investment in machinery and [equipm]ent than in men, and so the average number of employees in [larg]e scale plants is not so large as in the automotive industries. [Another] new industry which has developed on a large scale is *rayon;* [illegible] 99 per cent of the 20,000 workers in rayon mills were in large plants averaging almost $10,000,000 output and over 2,000 [illegible].

The foregoing figures have been those of manufacturing business[es. Ho]wever, the tendency to increase the size of the business unit and the group labor has not been confined to manufacturing establishments. Banks, department stores, mail order houses, insurance companies have gone through the same process of growth—until they too bring together large groups of people in one building, and still larger numbers under the same management, although in scattered groups. The Metropolitan Life Insurance Company employs 10,000 clerks in one building in New York City; the American Telegraph and Telephone Company payroll covers about 300,000 employees. Examples could be mutiplied, but it is clear that we have large scale establishments and resultant group labor in nearly all lines of activity.

7. FORMULA FOR AN EFFICIENT WORKMAN[12]

Efficiency and Development of the Individual Depends On

A. Ability To Work
- I. Mental Efficiency
  - 1. Mental Equipment
    - *a*) Intelligence
    - *b*) Temperament
    - *c*) Schooling
    - *d*) Experience

    Proper Initial Selection
  - 2. Assignment
    - *a*) Job Specifications
    - *b*) Mental Examination
      - Intelligence Test Interviews and Records
    - *c*) Standards of Output
    - **d*) Systems of Transfers
  - 3. Instruction
    - **a*) Task Instruction
      - Motion Study, Instruction Cards Where Necessary

[12] Adapted from Boyd Fisher, "The Formula for an Efficient Workman," *Bulletin of the Taylor Society,* VI, No. 6 (December, 1921), 236. Starred items are considered as falling more especially under the production department.

b) Plant Instruction
Systematic Routing, Rule Book, Bulletin Boards, Shop Paper, Safety Meetings, etc.
c) Trade Instruction
Training School
d) General Education
Textile Classes, Americanization, Dramatic Clubs, Glee Clubs, Literature, etc.
4. Supervision
**a*) Foreman
Daily Assignment, Foreman Training
b) Service Department
Efficiency Record, Personal Contacts, Rating Cards

II. Physical Efficiency
1. Physical Development
a) Physical Examination
b) Athletics
2. Health
a) Nurses' and Doctors' Work
b) Health Education
c) Fatigue Studies
d) Posture and Seating
e) Hygiene
f) Recreation
g) Nursery
h) Dentistry
i) Optical Work
j) Specialized Medicine
3. Assignment
a) Physical Classifications
b) Job Classifications
**c*) Task Setting
4. Plant Conditions
**a*) Cleanliness and Sanitation
**b*) Humidity
**c*) Illumination
**d*) Heating
**e*) Ventilation
f) Safety
5. Equipment
**a*) Good Machines
**b*) Proper Machine Setting
**c*) Good Tools
**d*) Mechanical Aids
**e*) Good Maintenance
**f*) Power and Transmission

6. Material
   *a) Right Material
   *b) Right Supplies
   *c) Raw Material on Time
      Routing, Scheduling, Internal Transportation
   *d) Supplies on time
      Central Stores, Balance of Stores
   *e) Traffic

B. Willingness To Work

I. Conscious Will

1. Discipline
   *a) Ratings
   *b) Rules and Penalties
   *c) Deductions for Spoiled Work
   d) Attendance Record
   *e) Discharge When Necessary
   *f) Transfer

2. Enthusiasm
   a) Internal Publicity
   *b) Treatment
   *c) Good Running Work
   *d) Honestly Set Task
   *e) Payment
      Payment by Results, Living Wage
   *f) Promotion
   g) Organized Spirit of Rivalry and Good Will
      *Competitions, Records Posted, Rallies, Shop Paper
      *Good Supervision
   h) Suggestion System
   i) Shop Committee
   *j) Steady Work

II. Unconscious Will

1. Home Conditions
   a) Housing
   b) Community Work
   c) Mental Hygiene

2. Treatment
   *a) Dignified Supervision
   b) Correct Payrolls
   c) Correct Time and Tally Keeping
   *d) Guaranteed Tasks

3. Plant Conditions
   *a) Cleanliness and Sanitation
   *b) Humidity
   *c) Illumination
   *d) Heating

- *e) Ventilation
- f) Safety

4. Financial Incentives
   - a) Continuous Employment
   - b) Insurance Benefits
   - c) Realization of Promotions
   - d) Old Age Pensions

See also, "Securing and Maintaining an Effective Working Force," 655.

B. Position of the Worker as a Producer: Fears and Insecurities

In this part of our study we seek to understand the position of the worker in the present economic order. We wish to examine his ability to produce and his will to produce; we wish to secure a general idea of the effect of his way of making a living upon his life, although a more extended analysis of this problem will come later, in Part III.

As a result of the forces which have brought about the wage system of production, the modern worker has many reasons to congratulate himself on his better lot, as compared with that of earlier types of workers. He has better housing, better food, greater freedom of movement; he has less fear of local famines, less fear of the powers of nature, greater control of disease, and greater physical comfort; in many ways he is more secure.

But there are also elements of insecurity in his position, and his fears and uncertainties react upon both his ability and his willingness to produce, to say nothing of their reaction upon the other aspects of his life. As matters stand today, the dependent worker (who is our prime concern in this present discussion) is to a considerable extent subject to the risks and uncertainties of capital. If the position of capital is insecure, the worker will be insecure in his employment, and thus his livelihood is uncertain. Notwithstanding the fact that the entrepreneur serves as a sort of insurance concern for the worker, notwithstanding the fact that the large indirect costs of modern industry bring some pressure upon an employer to retain his workers longer than was the case under the domestic system, it still remains true as a

broad generalization that the worker is liable to suffer from the uncertainties in which capital and management find themselves. It matters not at all that the worker has had little, if any, part in bringing about the state of affairs which has caused these uncertainties.

And there are other uncertainties and disadvantages for the worker even when capital is quite secure. Industrial accident, occupational disease, fatigue, inadequate wage, inadequate opportunity are all possibilities, and in thousands of cases they become actualities. These uncertainties arise in part from the nature of the technical processes of modern industry; in part from the position in which the worker finds himself in industrial society; in part from individual fault; in part from inadequate and at times even hostile social control.

It may well be that many of the evils of his situation are not essential parts of a wage system. Professor Fetter has defined the wage system as "the organization of industry wherein some men, owning and directing capital, buy at their competitive value the services of men without capital." A moment's reflection will show that it is not an essential part of the wage system that the parties should be unequal in the competitive struggle.

The evils of the situation are countenanced by no one; both by individual initiative and by social control we look toward their elimination.

The following issues[12a] will point the way to a profitable reading of the selections in this section:

1. Wherein is the work contract a device for organizing to get done the work of an economic society?
2. What are the chief fears and insecurities of the worker in the present order?
3. In what respects does each of these fears and insecurities affect the productivity of our economic order?
4. In what respects do the social attitudes and outlooks which condition our economic order work against rapid elimination of those fears and insecurities which make for lessened productivity?

[12a] A more detailed statement of issues may be found in *Outlines of the Economic Order*, pp. 126–31. (The University of Chicago Press.)

1. SECURITIES IN MODERN ACHIEVEMENTS AND METHODS[13]

Security of life.—One of the outstanding securities possessed by the worker today is a relative immunity from famine and disease. The wonderfully improved means of transportation have brought the products of the areas having a surplus to the very doors of the areas suffering from scarcity, and the no less marvelous improvements in medical knowledge have rendered the recurrence of the plagues of the Middle Ages unthinkable.

Security through participation in government.—Formerly government was in theory and fact the concern of the few. Today, although the actual functions of government are still exercised by a small group, the possession of the ballot by the worker is likely to make these rulers conscious of the fact that the power they hold is delegated. True, the worker may be characterized as both blind and somnambulant; yet he is a giant the possibility of whose awakening causes his interest to be treated cautiously and sometimes with solicitude.

Security through education.—Another security is seen in the universalizing of education. The worker's share in education has, to be sure, been limited by his occupational restrictions and confined largely to the more primary matters. But the ability to read and write has tended to limit his exploitation, and has afforded him some measure of self-expression and the means of co-operation with his fellows. Perhaps it is not making too strong a statement to say that education is the worker's greatest leverage for overcoming the handicaps imposed because of lack of property, family position, and control over the conditions of his employment.

Security through expanded production.—Contributing to the security of the worker is the technical efficiency of machine society in producing vast quantities of want-satisfying goods. But, someone may object, of what avail is it to increase the amount of consumable goods if population in industrial society tends to increase in the same or even in an accelerated ratio, or if the increase in the sum total of goods produced is not accompanied by corresponding improvement in the distribution of these goods to assure the worker a proper share in the potential comforts and pleasures which these goods represent? To

[13] Adapted from a statement prepared by Willard E. Atkins in Douglas, Hitchcock and Atkins, *The Worker in Modern Economic Society*, pp. 388–91.

the second objection, that unequal distribution may prevent the worker from sharing in the increased total of want-satisfying goods produced, it should be observed that such growing devices as inheritance and income taxes built upon a progressive base, the fast growth in city, state, and national concern for common access to education, playgrounds, art galleries, etc., and the assurance of certain minimums in wages, safety, and health—all tend to secure a direct distribution of wealth upon a more equal basis or to distribute it indirectly by making the more fortunate pay the costs of providing through state activities for the welfare of the mass.

Security through mass action.—Additional security is gradually becoming a fact through the campaigns to prevent accident, stabilize employment, and, where a loss cannot be avoided, to meet it through various systems of insurance whereby the direct or indirect difficulty of the individual is provided for by contributions from the mass. Under this heading can be suggested campaigns like the "safety first" movement, legislation providing safeguards for workers, studies in the prevention of unemployment and occupational disease, and various forms of insurance to meet the burden of ills which cannot be prevented which include various forms of insurance against accidents, unemployment, dependent old age, sickness and occupational disease.

Security through class consciousness.—These securities of mass action have been greatly abetted by class consciousness. It is the recognition of the solidarity of class interest which has made large groups of organized workers willing to contribute to the support of smaller local groups or isolated individuals which may be dependent for example, because of strikes, sickness, death, or unemployment.

Security through ethical standards.—Modern workmen appear to be more secure through the development of ethical standards. It is true that the earlier era of concentrated, impersonal machine industry destroyed both the claim on the employer and the claim on the community which the manorial worker possessed. Spontaneous aid to a sufferer has become less easy in the sharply competitive and commercial city. Yet the power of the state is gradually being evoked to protect women and children, and workers in extra-hazardous occupations. Housing programs and regulations, free libraries and clinics, all point toward the increasing socialization of property. Codes of pro-

fessional ethics have been developed to safeguard particularly the less fortunate from the prosecutions of shyster lawyers, the purveyor of fraudulent securities, and the medical quack. Growing respect for human beings as human beings has been reflected in the appeals for guaranties of minimum standards of living, the breaking of caste barriers to education, the abrogation of cruel and unusual punishment, and theories and procedures designed to secure to all equality before the law.

Security through method and spirit of science.—Finally it may be said that underlying all these securities of the modern worker is the scientific method itself, the method of fearless investigation and application which assumes that all phenomena lie within the sphere of man's potential knowledge and possible control. The multitude of ways in which man's control over his environment has been extended have all tended toward the breakdown of taboo and to the realization of the inherent assumption of science that nothing is too sacred or too difficult to be subjected to man's intelligence. Man has passed first through the period wherein he, like other animals, appropriated the things which nature furnished, then through the period in which he adapted the things of nature to his own use, and finally he is at the threshold of the period wherein he knows he can and he is molding "an artificial world nearer to his heart's desire. Creative evolution is at last becoming conscious." With it all the worker is promised a security beyond anything which he has yet attained.

2. THE FEARS OF LABOR AND OF CAPITAL[14]

In the process of Industry, the unwillingness of individual parties to put forth their utmost effort may arise from defects of character, inadequacy of training, or lack of opportunity. Where opportunity, training, and capacity are present, failure to realize the best in effort arises mostly from the fear that one or other of the parties will put forth a less than proportionate share of effort, or claim a more than proportionate share of reward.

The fears which circumscribe the freedom of effort of Capital, Management, and the Community are by no means so real or consid-

[14] Adapted from W. L. M. King, *Industry and Humanity*, pp. 234–43 (1918). By permission of and arrangement with Houghton Mifflin Company.

erable as those which surround Labor. They differ, also, in that they represent consequences much less serious to human life.

Capital can wait for its reward. Capital, moreover, is free to move about. If not required in a particular locality or business, it readily finds investment in some other place or enterprise. Labor is not so mobile. It is confined in a thousand and one ways. It is necessarily largely restricted to occupations to which it has been trained. It is more or less rooted to localities which speak of home and its associations. It is largely ignorant of the world without. Capital is a citizen of the world, with no definite occupation or home. It suffers little from fears of isolated position, substitution, dismissal, arbitrary and unjust treatment. Such risks as it runs are very largely its own. How vastly different is life to its possessor under such circumstances!

It is the fear of unemployment which lies at the root of most of the minor fears which Labor entertains. The fear of unemployment is in reality the fear on the part of Labor that capital will not be provided to carry on industry continuously, and under conditions which will afford adequate remuneration to effort. It is an outgrowth of the fallacy that quantity of work is necessarily limited. This fear gives rise to the fear that the introduction of new machinery, or the increased use of machinery already installed, will displace labor; the fear that speeding-up processes will diminish work; the fear that female, child, unskilled, or imported labor will be substituted for skilled; the fear that men of one trade will encroach upon the work for which men of other trades have been specially trained; the fear that the number of apprentices will be so increased as to lessen the requirement for skilled hands; and the fear that long hours and continuous overtime will exhaust employment.

Allied to the fear of unemployment is a class of fears which, as seen, have a special bearing on industrial peace: the fear of discharge and of unfair treatment through the utter helplessness of the isolated workman in relation to the capitalist employer, and, still more, in relation to a powerful corporation; the fear of lockouts or arbitrary exactions, and the many years incident to tyrannical and capricious behavior on the part of those in authority, and especially of subordinate officials toward workers under their direction. This fear extends to the power of wealth to defeat the ends of justice, by corrupting offi-

cials and influencing or controlling the judiciary and legislatures, and to the influence also of a class interest and sentiment on the part of the monied classes as distinguished from the working classes. With it are allied the many fears which have a special bearing on health in Industry: fears, for example, of physical injury and ill-health, and of inadequacy of compensation or redress when injury is done.

Arising from the worker's sense of utter helplessness is also the fear, apart from combination, of the absence of any voice in determining the contract on which services are given, and the fear, in consequence, of unfair terms in bargaining and in determining the rate of remuneration, the hours of labor, and working conditions. This extends to the fear of reductions in standards already gained; the fear of individual or general reductions in wages, of increase in hours, of change in customary practices; the fear of resistance on the part of employers to combination; and the fear of methods intended to destroy or weaken organization. Whatever begets fear of opposition to organization helps to intensify other fears.

Beset by fears at once so numerous and constant, it must be apparent that Labor is in no way capable of putting forth effort to the utmost of its capacity. Where the mind is in a state of unrest, the arm is divested of some of its power, and the hand of some of its skill. Time which otherwise might be freely employed in furthering production, with benefit in opportunity and reward to all the parties to Industry, is consumed in effecting organization against ills that are feared, or in agitation concerning their existence.

Whilst less serious in their immediate personal consequences than the fears which Labor endures at the instance of Capital, the fears which Capital experiences at the instance of Labor are by no means inconsiderable or unreal. What these fears are is well known; they have received heightened emphasis under the stress of war. The source of all is the fear that Labor will not be provided in quantity and quality sufficient to carry on Industry continuously, and under conditions which will afford adequate remuneration to investment. Foremost is the fear of strikes, and their consequences. If Labor refuses to work, Capital and Management likewise become idle, unless transferred to other industries. Transfer, however, is not always possible. Capital investment in Industry is partly "fixed" in plant and equipment; and

markets, as well as Labor, have to be found for the output of new enterprises. Management, too, becomes identified with particular classes of business, and new openings are not always at hand.

Allied to the fear of strikes is the fear of labor combination, and its attempts to control the labor market, and to restrict output. This fear has greatly increased with the augmentation of Labor's power consequent upon extensive organization and the growth of class consciousness. The obnoxious restrictions are all in the nature of limitations upon the freedom of initiative and power of direction, usually of the employer, but sometimes also of the workman. Briefly classified, restrictions of the kind include such practices as hampering the installation of the best machinery, or the speed at which it is worked; preventing the introduction of new processes; limiting the freedom to engage, or to promote, or to put at any kind of work, any workman, irrespective of training, age, or sex. Among such restrictions are also to be included the limitation in numbers of apprentices; the insistence on trade unionism and employment of union labor to the exclusion of any other; the demarcation of employment; the requirement of a minimum wage; the objection to systems of remuneration by piece work or bonus systems; and restrictions in hours of work, and the prohibition of overtime.

Analogous to the class of fears begotten of labor control and restricted output, are the fears that "discipline," as it is termed, will be interfered with; that employers will not be free to dispense with the services of undesirable, incompetent, or unnecessary workmen without risking a cessation of work; and that disputes cannot be adjusted except in accordance with methods prescribed by organizations to which workmen belong.

The fear that Labor can be secured, so to speak, only on its own terms, which may involve exorbitant demands as respects hours, wages, and working conditions, is supplemented by the fear that even where a contract is entered into, with precise stipulations, its provisions may not be lived up to. There is the fear also that one concession may be used to force another, and that arbitrary exactions of many kinds may be attempted.

Finally, there is the class of fears associated with extreme measures, with revolutionary movements, and with violence, as, for exam-

ple, the boycott, sabotage, revolutionary socialism, revolutionary syndicalism, the I.W.W.'s, and all forms of anarchy.

3. INDUSTRIAL ACCIDENTS AND DISEASE

A. THE HAZARDOUS NATURE OF MODERN INDUSTRY[15]

In the first place, a high degree of hazard inheres in present-day methods of production. Modern technology makes use of the most subtle and resistless forces of nature—forces whose powers of destruction when they escape control are fully commensurate with their beneficent potency when kept in command. Moreover, these forces operate, not the simple hand tools of other days, but a maze of complicated machinery which the individual workman can neither comprehend nor control, but to the movements of which his own motions must closely conform in rate, range, and direction. Nor is the worker's danger confined to the task in which he is himself engaged, nor to the appliances within his vision. A multitude of separate operations are combined into one comprehensive mechanical process, the successful consummation of which requires the co-operation of thousands of operatives and of countless pieces of apparatus in such close interdependence that a hidden defect of even a minor part, or a momentary lapse of memory or of attention by a single individual may imperil the lives of hundreds. A tower man misinterprets an order, or a brittle rail gives way, and a train loaded with human freight dashes to destruction. A miner tamps his "shot" with slack, and dust explosion wipes out a score of lives. A steel beam yields to the pressure it was calculated to bear, and a rising skyscraper collapses in consequence, burying a small army of workmen in the ruins.

In the second place, human nature, inherited from generations that knew not the machine, is imperfectly fitted for the strain put upon it by mechanical industry. Safely to perform their work the operatives of a modern mill, mine, or railway should think consistently in terms of those mechanical laws to which alone present-day industrial processes are amenable. They should respond automatically to the most varied mechanical exigencies, and should be as insensible to fatigue and as unvarying in behavior as the machines they operate.

[15] Adapted by permission from E. H. Downey, *History of Work Accident Indemnity in Iowa*, pp. 3–5. (Published by the State Historical Society of Iowa, 1912.)

Manifestly these are qualities which normal human beings do not possess in anything like the requisite degree. The common man is neither an automaton nor an animated slide-rule.

The machine technology, in fact, covers so small a fraction of the life history of mankind that its discipline has not yet produced a mechanically standardized race, even in those communities and classes that are industrially most advanced. And so there is a great number of work injuries due to the "negligence of the injured workman"—due, that is to say, to the shortcomings of human nature as measured by the standards of the mechanician.

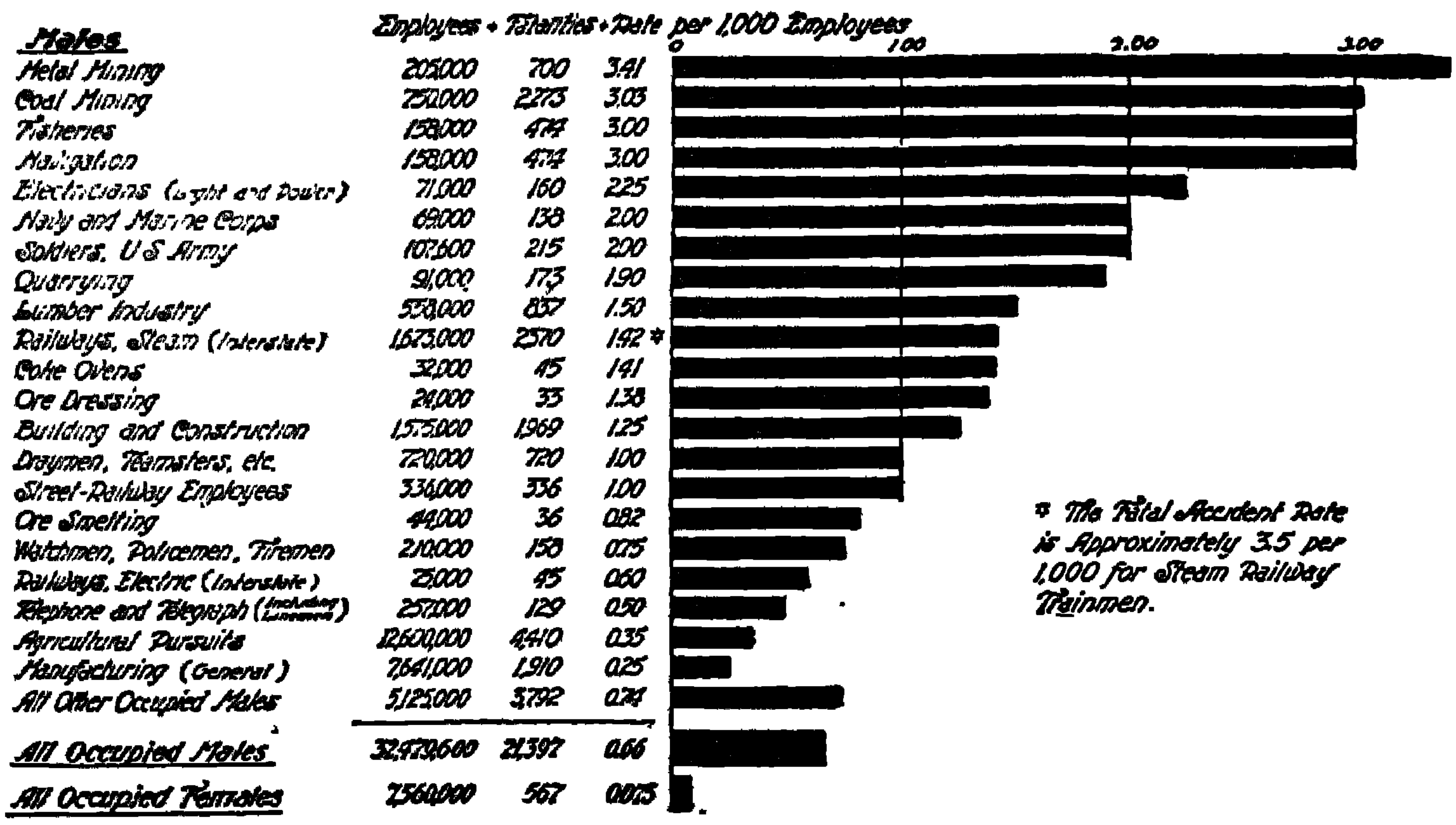
See also "Some Consequences of the New Technology," page 554.

B. CAUSES AND EXTENT OF INDUSTRIAL ACCIDENTS[16]

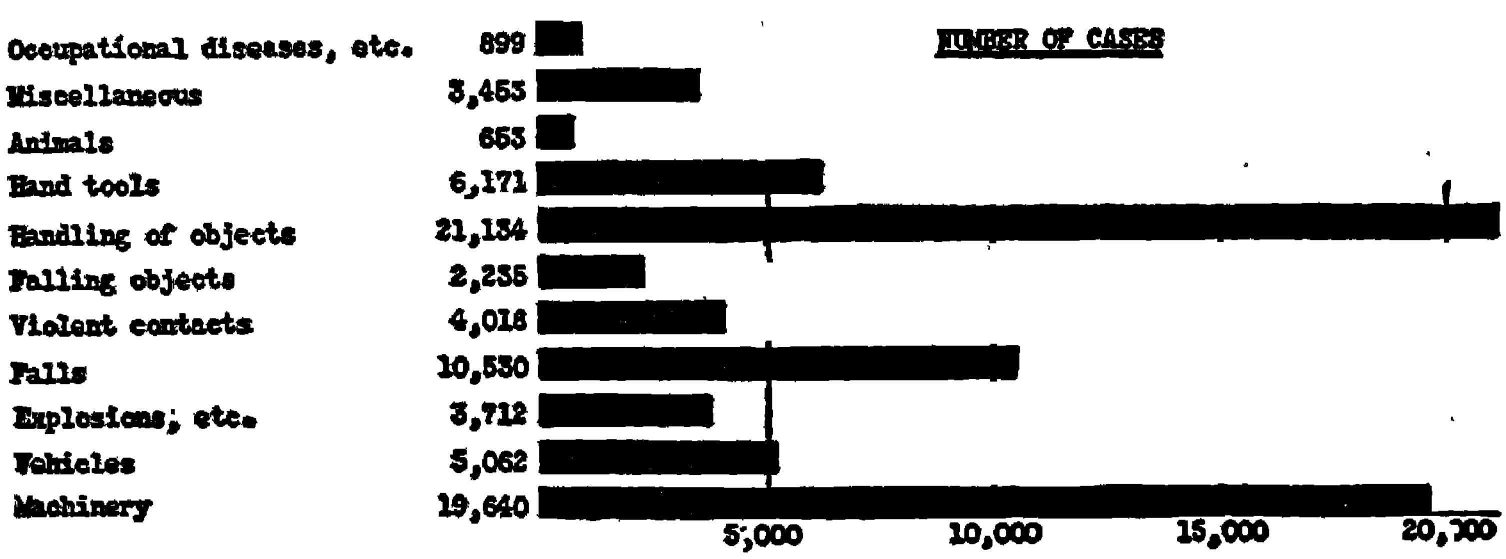
It is estimated that there are 21,232 fatal accidents and a total of 2,453,418 industrial accidents in industry in the United States each year. In 1922, over 500,000 accidents were so serious that the injured workers each lost four weeks or more; and over 1,000,000 accidents caused a loss of at least two weeks each. The time lost because of injury and death through industrial accidents is estimated to be 227,169,970 man-days per year, counting death or permanent disability as a loss of 6,000 days. If the earnings of these workmen averaged four dollars and a half per day, the loss in wages would amount to $1,022,264,806, to say nothing of the cost of medical care and of loss of efficiency. If one were to seek to compute the total cost, he would include such items as the cost of idle machinery and idle plant space and of training new workers to replace the workers killed or disabled by accidents—and the worker's expenditures for hospital bills, medical and surgical care.

Mining, fishing, stevedoring, lumbering, railroading, and building construction are the dangerous occupations; agriculture and "general manufacturing," the least dangerous. Occupations of men are, on the whole, 8.4 times as hazardous as those of women.

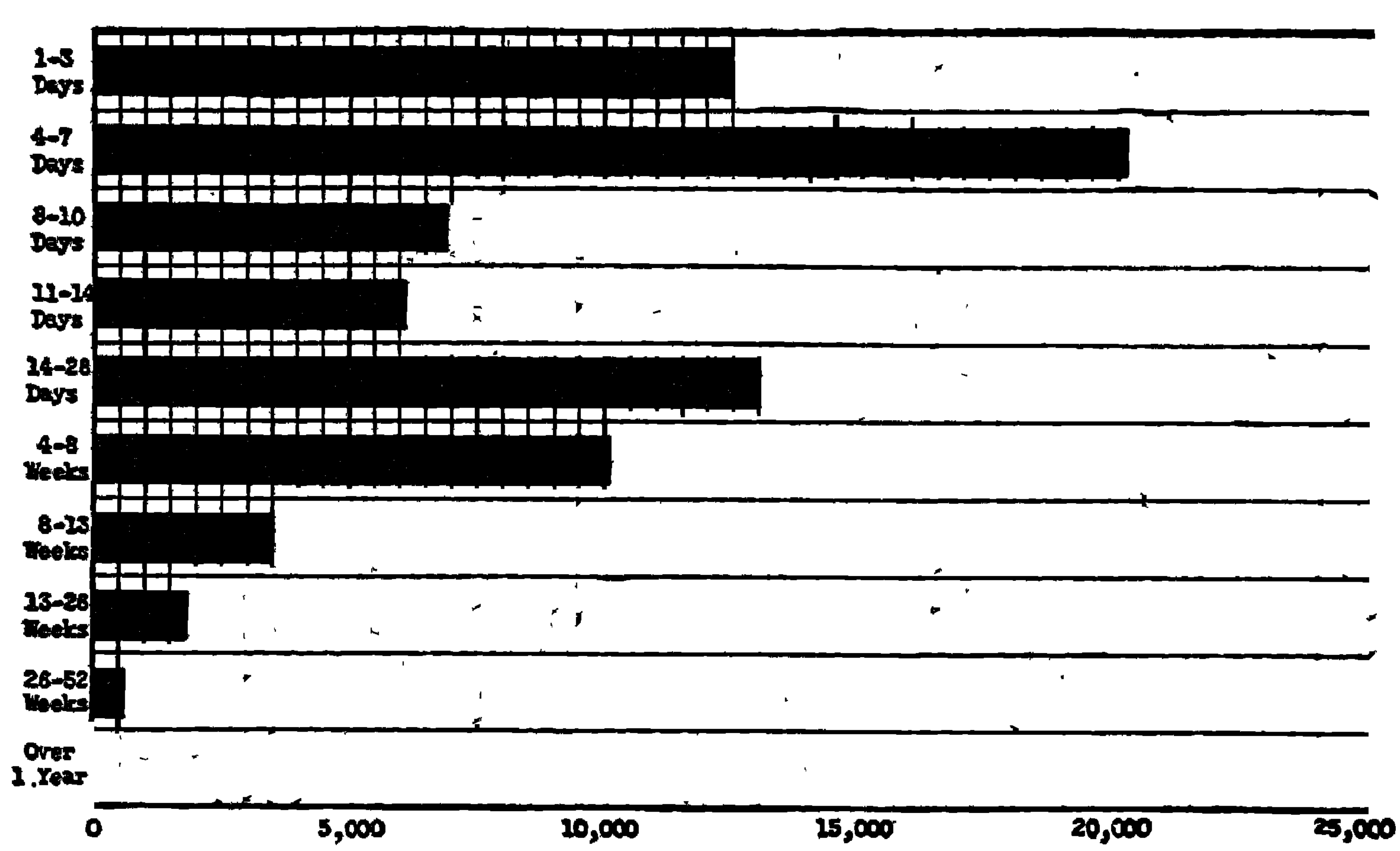
[16] Adapted from Wiese and Reticker, *The Modern Worker* (1929). Reprinted by permission of The Macmillan Company, publishers.



Estimate of Fatal Industrial Accidents for the United States for One Year



Distribution of Injuries (A Massachusetts Study)



Duration of Disability in Cases of Temporary Total Disability

The length of time the worker is disabled is always a matter of serious concern. The graph shows the experience of Massachusetts as reported by the Industrial Accident Board.

It is clear that accident losses are so great that every one concerned should take steps to reduce these hazards of modern industry. Obviously, knowledge of the causes of accidents is the first step in a program for reducing them. The cases reported in New York State (New York has more complete records than have other states) in the year ended June 30, 1927, are divided into eight groups: handling objects, falls, machinery, vehicles, hand tools, falling objects, explosions and hoisting apparatus. More than one quarter (27,000) of all accidents for which compensation was paid were due to handling objects—heavy or bulky objects, sharp or rough objects, hand trucks, carts and wheel barrows.

Behind the direct causes cited in these diagrams are often other indirect causes. Bad factory housekeeping results in dark stairways and gangways, unprotected elevator shafts, wet floors, broken steps, loose articles left around on floors or shelves, unprotected wheels, gears and belts. Then, too, psychological factors enter into accidents; a toothache, or headache, worry over illness at home, haste, the recklessness of youth, or an emotional upset because of a worker's resentment of a reprimand may be the underlying cause of an accident. Inexperience is another prolific source of accidents. New employees (those having less than one month's service) are six times as liable to have accidents as those who have been on the job over one month. In the case of some workers, inexperience is intensified by ignorance of the language. A large steel company found that its non-English speaking workers suffered accidents two and three-tenths as often and one and four-tenths as severe as the English speaking workers. The American temperament is blamed for accidents by some observers who feel that recklessness is part of the American creed.

C. OCCUPATIONAL DISEASES[17]

Besides the danger of injury from machinery and from general insanitary conditions, there are certain specially dangerous or injurious trades, in which injury by poisoning, disease, etc., is incidental to trade processes as at present conducted. Mr. William English Walling, formerly a factory inspector in Illinois, in a paper read before the Convention of Factory Inspectors in 1900, classified these dangerous trades as follows:

[17] Adapted from *Final Report of the Industrial Commission*, 1902, XIX, 901–2.

1. Trades in which lead is a poisonous element: the manufacture of earthenware and china; file cutting; the manufacture of white lead; lead smelting; the use of lead in print or dye works; the manufacture of red, orange, or yellow lead; glass polishing, enameling of iron plates; enameling and tinning of hollow metal and cooking utensils; processes in which yellow chromate of lead is made, or in which goods dyed with it undergo the process of building, winding, weaving, etc.

2. Trades which produce other chemical poisons: manufacture of paint and color; extraction of arsenic; dry cleaning; paper staining, coloring, and enameling; hatters' and furriers' work; the manufacture of matches; chemical works; bronzing and metallochrome powder in lithographic works; india-rubber work; dyeing with certain dyes; mixing and casting of brass, gun metal, bell metal, white metal, phosphor-bronze, and manila mixture.

3. Trades in which anthrax or lockjaw is an incident: wool sorting; the handling of hides and skins; hair factories; brush making; bone factories; fellmongers' works; furriers' works; tanneries; wool combing; blanket stoving and tentering; warp dressing; carbonizing and grinding of rags; flock making; feather cleaning.

4. Trades in which the danger arises from injurious particles in the air, or from dust: basic slag works; manufacture of silicate of cotton; file cutting; flour mills; trades which use grindstones or emery wheels; china scouring; silk combing; flax scutching.

5. Trades in which accidents are so frequent as to demand special legislation: metal works which use converters; electrical generating works; bottling and bottle testing; quarries; manufacture of salt.

6. Processes which require a sudden change from great heat to cold, and vice versa: lacquering and japanning; galvanizing of iron, work carried on in furnaces and foundries.

7. Processes that require artificial humidity: cotton spinning, weaving, etc.; flax spinning, weaving, etc.; wool spinning; silk spinning.

As an example of disease resulting from poisoning may be mentioned plumbism, the disease caused by inhaling particles of lead. One of its first symptoms is a blue gum, followed by loosening and dropping out of the teeth. Blindness, paralysis, and death in convulsions

often follow. Besides plumbism, there are serious indirect results from lead poisoning in a number of different occupations.

[Note.—*Bulletin 306 of the United States Bureau of Labor Statistics* makes the following list of industrial hazards: (1) abnormalities of temperature, (2) compressed air, (3) dampness, (4) dust, (5) extreme light, (6) infections, (7) poor illumination, (8) repeated motion, pressure, shock, etc., (9) poisons.]

Preventive measures.[18]—A large amount of the unnecessary sicknesses and premature deaths may be prevented with comparatively little effort or cost on the part of the employer. Many occupational diseases may be prevented by:

(1) Securing the scientific ventilation of workrooms, especially by the installation of efficient local exhausts which remove dust at points of generation. In some industries, such as in smelting and refining, fountain-pen-point manufacturing, jewelry, etc., the dust created is valuable, and it has been found profitable to recover the valuable material from the collected dust by means of a patented electrical precipitation process.

(2) Securing cleanliness by providing ample washing or bathing facilities. Some plants provide separate lockers for street clothing and working clothing, so arranged that the worker must remove his working clothes, hang them up to dry or place them in the lockers, and must then pass through the shower room before he can get to his locker containing street clothing.

(3) Wearing of proper protective clothing, viz., respirators and goggles in dusty processes which cannot be taken care of by exhaust ventilation, as in sand-blasting and emery-wheel grinding; boots and gloves in wet and chemical processes; special shoes for foundry workers; helmets for welders; water-cooled furnace doors for hot-process workers; overalls, aprons, caps, etc.

(4) Shortening the working hours (and, therefore, the period of exposure), allowing rest or "spell" periods in fatiguing and exhausting work.

(5) Requiring physical examinations at entrance, to weed out those unfit for work and to place others where they are best suited

[18] Taken by permission from L. K. Frankel and Alexander Fleisher, *The Human Factor in Industry*, pp. 142–44. (The Macmillan Co., 1920.)

physically; and periodically to ascertain whether workers are suffering from the effects of their occupations so that changes may be made and treatment or necessary advice given.

(6) Providing medical care, including first aid and necessary subsequent treatment.

(7) Giving health instruction and safety education.

(8) Proper layout of plant and good housekeeping so that workers in one process are not unnecessarily exposed to the hazards of another adjacent process.

(9) Sanitation of plant to prevent the spreading of communicable diseases. This includes adequate and proper toilet facilities, sanitary bubbling fountains, individual towels, spittoons, etc.

See also "Accident Prevention," page 665.

D. FATIGUE[19]

1. Fatigue—the most common and subtle danger of occupation:
   a) It may be regarded as a chemical process—a continual tearing down of muscle and nerve tissues without building them up.
   b) In this way, fatigue substances or toxins come to circulate in the blood, poisoning brain and nervous system, muscles, glands, and other organs: When blood is transferred from an exhausted dog to a frisky one, the latter immediately droops and shows all the signs of fatigue.
2. Objective causes of fatigue:
   a) Long hours—in the steel industry, the working day is usually twelve hours, seven days in the week.
   b) Monotonous, speeded-up operations—at many machines a quick pressure of the foot and accompanying hand-movements are repeated "40 times a minute, 24,000 times a day."
3. Results of fatigue:
   a) Fatigue and industrial inefficiency—poorer work and less work is done in the last hours of a day's labor than in the earlier hours.

[19] Taken by permission from E. S. Bogardus, *An Introduction to the Social Sciences*, pp. 44–45. (University of Southern California, 1913. Author's copyright.)

b) Fatigue and contagious diseases—an overworked laboring man or woman is more susceptible to pneumonia, tuberculosis, typhoid fever, than is a person whose vital resistance is normal. A typical succession of events is first, fatigue, then colds, then tuberculosis, then death.

c) Fatigue and nervous diseases—long hours of labor and feverish haste lead to nervous breakdown.

d) Fatigue and future generations—the children of overworked parents tend to be physical weaklings.

e) Fatigue and morals of working people—long hours of monotonous labor increase the susceptibility of the human organism to harmful temptations. The exhausted worker tends to neglect all family duties.

f) Fatigue and industrial accidents—the liability to accident increases with the daily hours of labor.

See also "Conditions of Work," page 662.

4. UNEMPLOYMENT

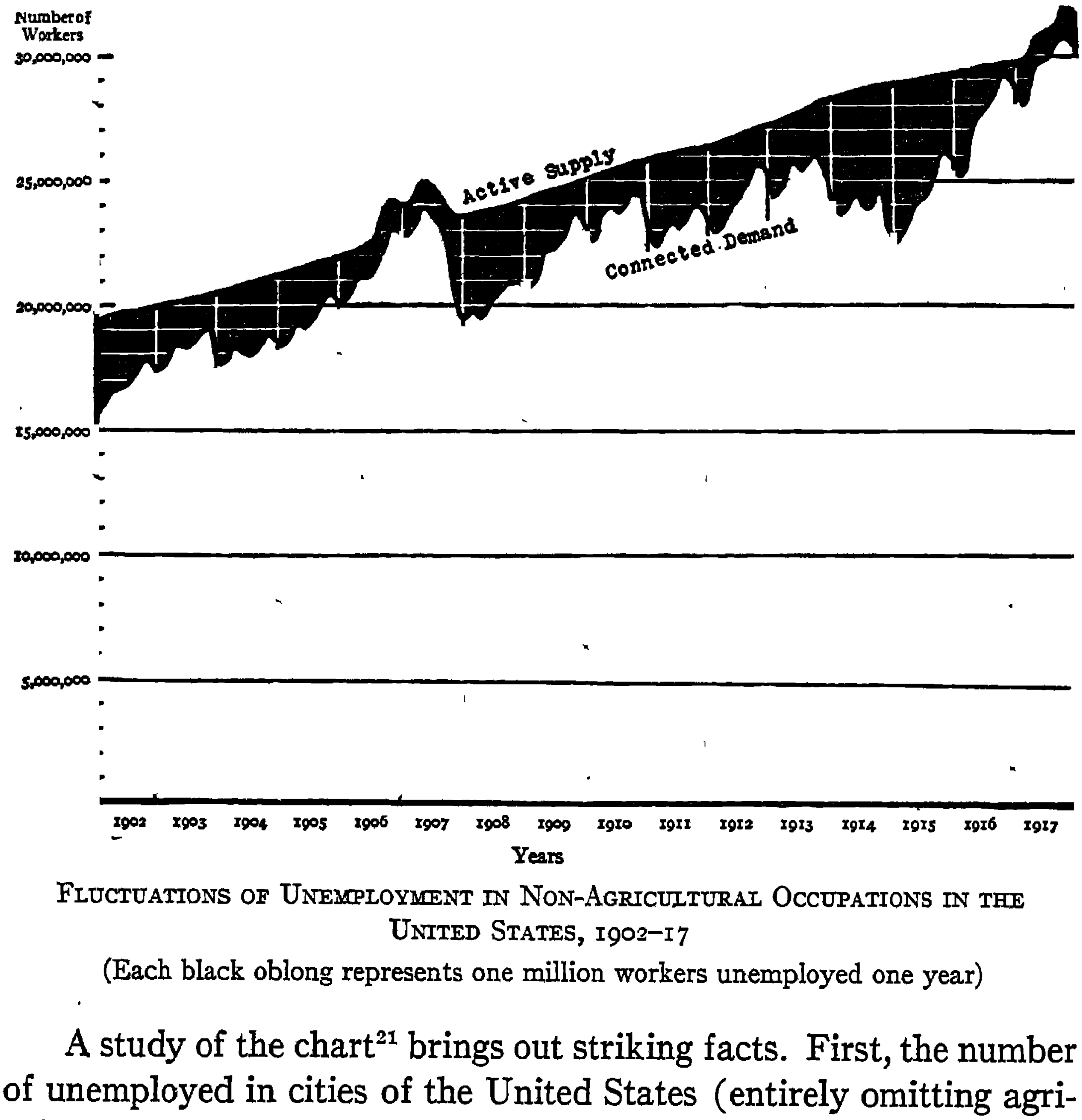
A. THE AMOUNT OF UNEMPLOYMENT[20]

On these facts [testimony of employers and workmen, data with regard to the number of unemployed at relief agencies and the number of applicants at employment offices, data from censuses and special investigations, trade-union statistics, etc.] we base our statement that at all times of the year in every industrial center of the State able-bodied men are forced to remain idle though willing to work. On any given day during the year at least 3 per cent of our wage-earners are involuntarily idle. Usually there are 10 per cent. These idle men must always be on hand to meet the fluctuating demands of the industries of the State.

Summarizing the data at our command, we should say that in ordinary years of business prosperity, taking all industries into consideration, out of every 100 persons, 60 will be steadily employed; 40

[20] From the *New York State Commission on Employers' Liability and Unemployment, Report of Committee on Unemployment,* 1911, pp. 38, 53–54.

will be working irregularly. Of those who have irregular employment 3 will always be out of work. The percentages vary with the different industries, but the experience is characteristic of every industry.



FLUCTUATIONS OF UNEMPLOYMENT IN NON-AGRICULTURAL OCCUPATIONS IN THE UNITED STATES, 1902–17

(Each black oblong represents one million workers unemployed one year)

A study of the chart[21] brings out striking facts. First, the number of unemployed in cities of the United States (entirely omitting agricultural labor, for which no reliable data are now available) has fluctuated between 1,000,000 and 6,000,000. The least unemployment occurred in 1906–1907, and 1916–1917, while the most occurred in 1908 and in 1914 and 1915.

[21] Taken with permission from Hornell Hart, *Unemployment in the United States, 1902–17*, Helen S. Trounstine Foundation, Cincinnati, Ohio, pp. 48, 51–53.

B. DIAGRAM OF CAUSES OF UNEMPLOYMENT[22]

- Regular Causes of Unemployment
  - Casual nature of certain trades
  - Repair of works
  - Climatic changes
  - Habitual changes of fashion
  - Reserves of labour round industrial establishments
  - Lack of proper organization in factories resulting in anarchic methods of hiring and firing workmen
- Irregular Causes of Unemployment
  - Uncertainties in Political Life
    - War
    - Changes in legislation bearing on economic activities
    - Irregularities of public works
  - Variations in Nature
    - Famines: Agricultural or other disasters
    - Earthquakes
    - Storms at sea (affecting dock labour)
  - Variations in the Comparative Attractiveness of Investments
    - Invention of new machinery
    - Improvement in industrial organization
    - Removal or displacement of an industry
    - Change of routes, of means of communication, and of tariffs
    - Alteration of waterways to the interior
    - Long time changes of fashion
    - Sudden immigration of workmen: a temporary flow of workmen towards a given industry or towards a given centre
    - Involuntary closing of factories
    - Changes in money value. Price fluctuations
    - Abuses of competition and speculation
    - Sweating system and abuse of employment of women and children
    - Excessive prolongation of the hours of labour
    - A crisis abroad or a change in the market of some other country
    - Changes in foreign competition and production

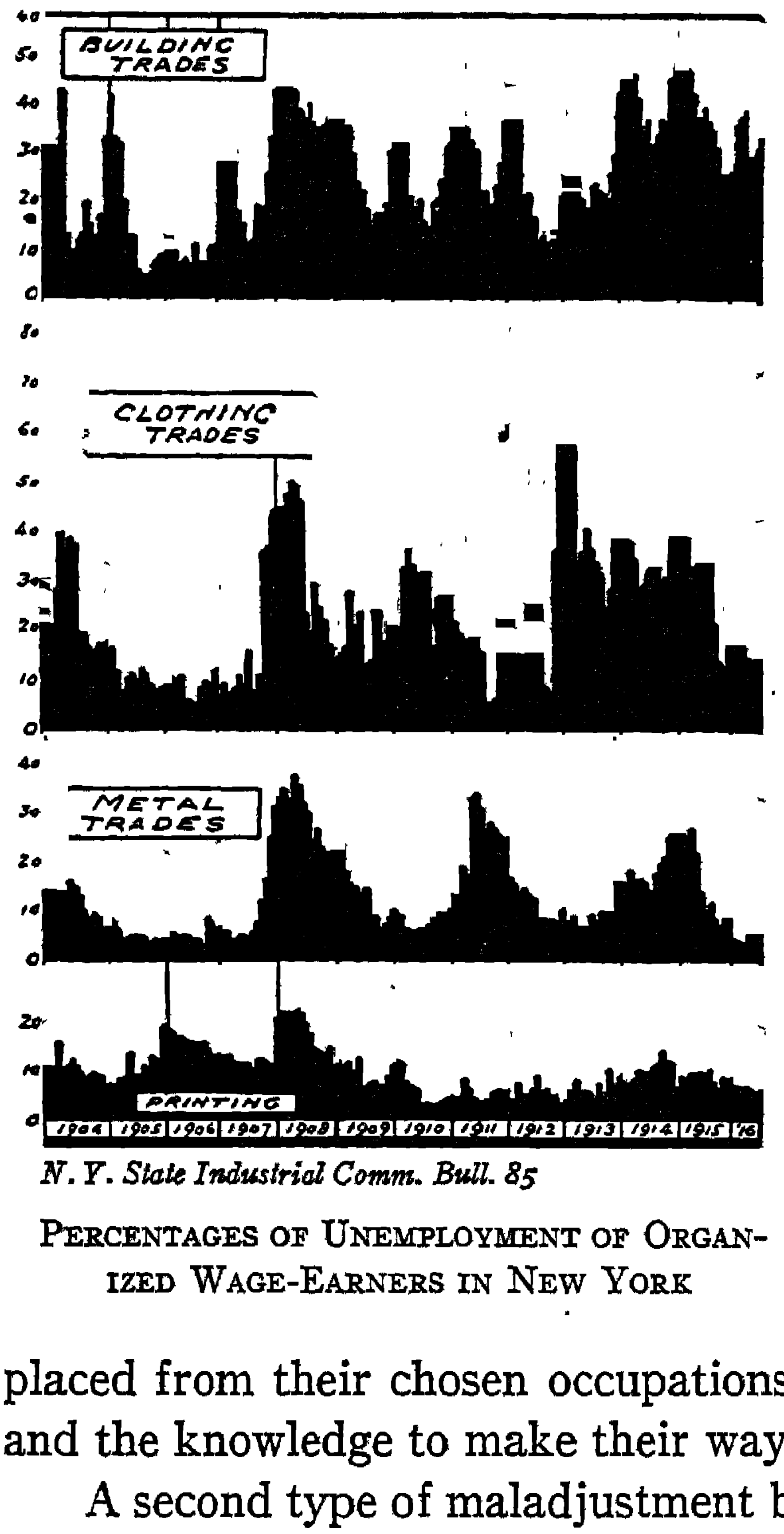
C. DISCUSSION OF CAUSES OF UNEMPLOYMENT[23]

The problem of unemployment is the problem of the adjustment of the supply of labour and the demand for labour. The supply of labour in a country is, in the widest sense, the supply of population. It is at any moment, apart from the possibilities of emigration and immigration, a fairly fixed quantity. Moreover, it is fixed for each moment, not by anything then happening, but by the habits and actions of millions of disconnected households a generation back. The demand for labour, on the other hand, is an aggregate of thousands or tens of thousands of separate demands in the present. It fluctuated with the fortunes and the calculations of the host of rival employers.

[22] Adapted with permission from Joseph L. Cohen, *Insurance against Unemployment*, p. 30. (P. S. King & Son, Ltd., 1921.)

[23] Adapted by permission from W. H. Beveridge, *Unemployment*, pp. 4–13, 81, 114. (Longmans, Green & Co., 1910.)

Discrepancy between two things so distinct in immediate origin is obviously possible. The problem has merely to be stated in order to shatter the simple faith that at all times any man who really wants work can obtain it. There is nothing in the existing industrial order to secure this miraculously perfect adjustment.



N. Y. State Industrial Comm. Bull. 85

PERCENTAGES OF UNEMPLOYMENT OF ORGANIZED WAGE-EARNERS IN NEW YORK

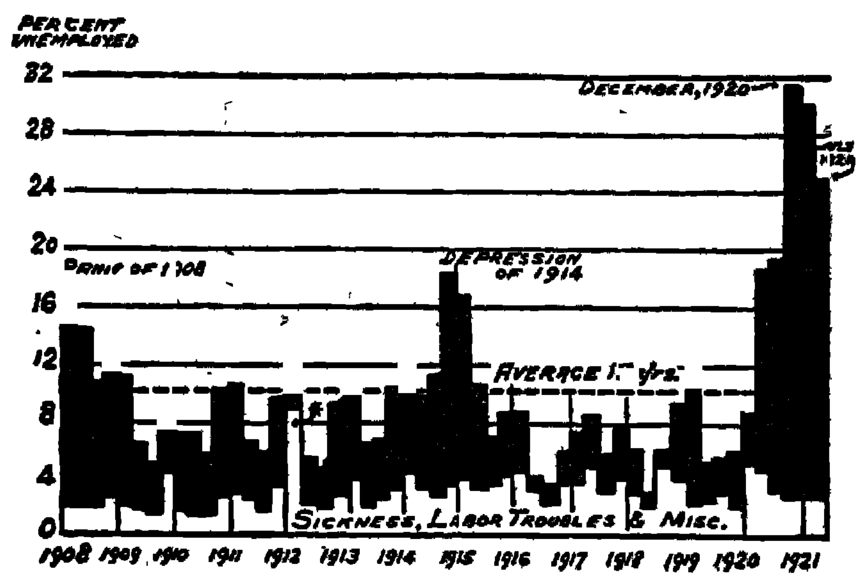
Unemployment is not to be explained away as the idleness of the unemployable. As little can it be treated as a collection of accidents to individual work-people or individual firms. It is too widespread and too enduring for that. There are specific imperfections of adjustment which are the economic causes of unemployment.

One of these has long been recognized. While industry, as a whole, grows, specific trades may decay, or change in methods and organization. The men who have learned to live by those trades may find their peculiar and hard-won skill a drug on the market and themselves permanently displaced from their chosen occupations, while lacking both the youth and the knowledge to make their way into new occupations.

A second type of maladjustment between the demand for and the supply of labour is found in actual fluctuations of industrial activity. Many trades, perhaps most trades, pass regularly each year through an alternation of busy and slack seasons, determined by climate or social habits, or a combination of both. Building is slack in winter and busy in spring and summer. Printers find least to do in the August holidays and most in the season just before Christmas. At the London

docks timber comes in at one time of the year; fruit at another; tea at a third. Behind and apart from these seasonable vicissitudes of special trades, and affecting, though in varying degrees, nearly all trades at about the same time, is a cyclical fluctuation in which periods of general depression—1868, 1879, 1885–1886, 1893–1895, 1904—alternate at irregular intervals with periods of feverish activity—1872–1874, 1881, 1889–1890, 1899–1900.

These two elements in the problem of unemployment have long been familiar. A third, apparently far more important than either the occasional transformation of industrial structure or the periodic fluctuations of industrial activity, is only just beginning to receive attention. This is the requirement in each trade of reserves of labour to meet the fluctuations of work incidental even to years of prosperity.



The Commonwealth of Massachusetts
Dept. of Labor & Industries
Division of Statistics

FLUCTUATIONS IN UNEMPLOYMENT IN MASSACHUSETTS, 1908–21

Percentages of organized wage-earners unemployed at end of each quarter. The shaded portions of the chart represent unemployment due to lack of work or material.

* Strike

Changes of industrial structure are constantly occurring and constantly throwing men out of employment. The very life and growth of industry consist in the replacement of old machines by new; of established processes by better ones; of labour in one form and combination by labour in fresh forms or fresh combinations. The demand for labour is thus in a state of perpetual flux and reconstruction both as to quality and as to quantity.

The changes which may have this effect are very various. Each indeed is so far individual and specific as to make exhaustive description impossible. All that can be done is to note the main types.

First, while the industry of the country as a whole grows, particular industries or forms of production may decay.

Second, an industry may be transformed by the introduction of

new processes or new machines. From this point of view the lace trade is particularly interesting.

Third, perhaps as an accompaniment of new processes or machines one type of labour may be substituted for another. Thus, in boot making, where the number of persons employed remains, in spite of the increased total population, practically the same in 1901 as in 1891, there has been, according to the census, not only a substitution of machine work for hand work, but also of females for males, and of younger for older males.

Fourth, the chief seat of an industry may shift from one part of the country to another. This, as in the instance of the lace trade mentioned above, may happen as the accompaniment of other changes. Sometimes—as in the removal of the main shipbuilding centres of the country from south to north—it may be independent of them.

See also "The Machine and the Laborer," page 562.

D. THE NEED FOR UNEMPLOYMENT[24]

The need for unemployment focuses around nine points, as follows:

1. The need of industries to select suitable applicants from among the candidates who present themselves, and to reject the unsuitable.

2. The need of workers to explore the market in order to find the place in which they can be most useful and most happy.

3. The need of being able to launch new enterprises without actually pulling away too many men who are already working in established industries.

4. The need—if it really exists—of the fear of losing the job as an incentive to make labor put forth as much effort as industry has a right to demand.

5. The need—if it exists—of strikes, to protect labor's legitimate interests, or of a replacement force in case of strikes, sufficient to prevent the community from being at the mercy of organized labor, but

[24] Adapted from J. M. Clark, *Studies in the Economics of Overhead Costs*, pp. 366–67. (The University of Chicago, 1923.)

not sufficient to put labor at the mercy of the cut-throat competition of unemployed workers who must take anything they can get.

6. Workers must have moved about from trade to trade in the process of acquiring trade knowledge, and this involves some necessary unemployment, though possibly no more than is already implied in laborers finding the place to which they are best fitted.

7. The need of a supply of labor to handle seasonal peaks and other incidental irregularities in particular industries. Here one must distinguish carefully between the need of some unemployment and the need of throwing upon labor the burden of financing it. The two are separate questions.

8. The need of a reserve to handle the peak of the business cycle. Here again, what industry feels as a need is to have this reserve without paying for its upkeep during the idle times.

9. The need of throwing upon labor a part, at least, of the burden of dovetailing together seasonal occupations and finding work in dull times, (*a*) to stimulate laborers to do their best in this direction and to make some concessions in order to utilize their own idle overhead, and (*b*) to relieve industry of a financial burden which it could not easily bear, and of the necessity of regularizing employment to a greater extent than it now finds practicable.

E. EFFECTS OF UNEMPLOYMENT[25]

1. *Lessened income.*—Unsteady employment affects wages in three ways: "It reduces the amount of the workmen's earnings; it causes irregularity of income; and it decreases his efficiency." Whether unemployment is as important as sickness in causing the breakdown of family independence is a disputed question; nevertheless, it plays a great rôle in family demoralization.

Lescohier cites an investigation in Connecticut which showed that the actual earnings of employees in different industries fell from 13 per cent to 18 per cent below full-time earnings. In New York 62.1 per cent of the paper-box workers and 63.4 per cent of the confectionery workers fell more than 10 per cent below full-time earnings.

2. *Destruction of the worker's efficiency.*—As Lescohier has so

[25] Adapted with permission from John L. Gillin, *Poverty and Dependency*, pp. 467–70. (Century Co., 1921.)

well said of the worker, unemployment destroys his capacity for continuous consistent endeavor; saps self-respect and the sense of responsibility; impairs technical skill; creates a tendency to blame others for his failures; prevents thrift and hope of family advancement; sends him to work worried and underfed.

3. *Effects on the family.*—It forces the mother out of the home to supplement the earnings of the man; it takes children from school at the earliest possible moment and places them in industry. It forces the family to move into poorer quarters.

4. *Industrial and political unrest.*—The unemployed man feels that in unemployment he has one more cause of complaint against the industrial order.

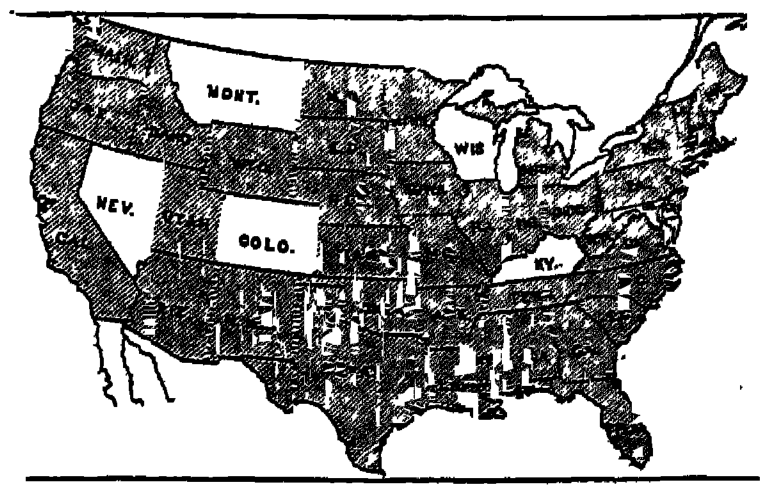
5. *Social demoralization.*—The moral standards of the unemployed man are impaired by spells of idleness; time lies heavy upon his hands; and in the course of time even the good workman may become desperate.

In the dull time of 1914 it is reported that in Boston men committed petty crimes in order that they might be sent to the workhouse. Then they were sure of their keep while their wives might draw from the city 50 cents a day. In 21 cities burglaries increased 30 per cent over the number in 1912, vagrancy 51 per cent, robberies 61 per cent, and mendicants 105 per cent. The divorce and suicide rates also increased.

Cumulative effects of unemployment.[26]—Unemployment results in lowering the quality of the workers. The worse fed are the children of the unemployed, the less will they earn when they eventually engage in some occupation themselves, and the less able will they be in turn to provide for the needs of their children, and so on. Again, the less trained they are the less will they realize the importance of giving their children a good training and the less able will they be to provide adequately for so doing. These evils are cumulative. Another group of evils and deep influences which are produced by unemployment result from its effect on trade unions. Periods of unemployment constitute a menace to trade unions; they result in a lowering of membership, a drain on the funds, and a weakening of their morale. Their

[26] Adapted with permission from Joseph L. Cohen, *Insurance against Unemployment*, pp. 35–36, 38–39. (P. S. King & Son, Ltd., 1921.)

power to bargain effectively is thus lessened. This disadvantage is cumulative in two ways: It lowers workmen's wages; this lowers their efficiency as workers and consequently the normal value of their labour. And in addition it diminishes their efficiency as bargainers still more, and thus makes it more likely that they will sell their labour for even less than the employer could afford to pay them.



WHERE THE "STANDARD BILL" PROVIDES OLD-AGE PENSIONS

Six states, Montana and Nevada (in 1923), Wisconsin (1925), Kentucky (1926), Colorado and Maryland (1927), and the territory of Alaska, have already adopted straight old-age pension laws, based on the "standard bill." The "standard bill" is a very modest proposal that a citizen of seventy years or upward who has also resided continuously fifteen years in the state, shall, if the value of the applicant's property does not exceed $3,000, be entitled to a pension which when added to other income shall not exceed a total of $1.00 a day. A state-county system of administration is provided on an economical basis with provision for careful local investigation and general supervision.

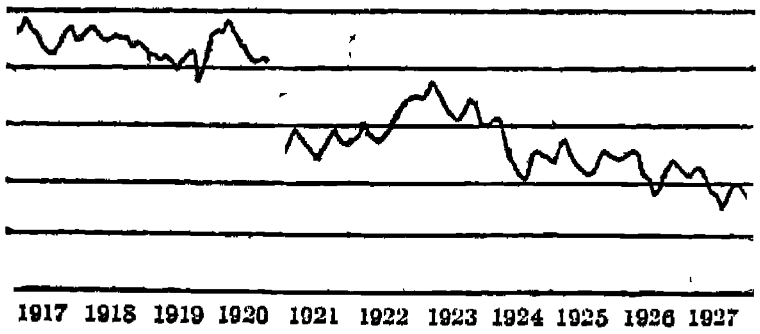
F. IS THERE TECHNOLOGICAL UNEMPLOYMENT TODAY?[27]

Between 1920 and 1927, factory employment in the United States decreased by approximately 10 per cent, and railroad employment by nearly 15 per cent. During the first nine months of 1928, factory and railroad forces have been smaller than in the corresponding period of 1927. In mining there has been no appreciable change since 1920, but in agriculture there was a drop of approximately 900,000 between 1920 and 1925, and it is probable that there has been an additional drop of over 400,000 between 1925 and 1928. The total shrinkage of employment in these four major branches of industry between 1920 and 1927 has probably been about 2,300,000.

During the last eight years there have been substantial increases of employment—no one knows precisely how large—in the profes-

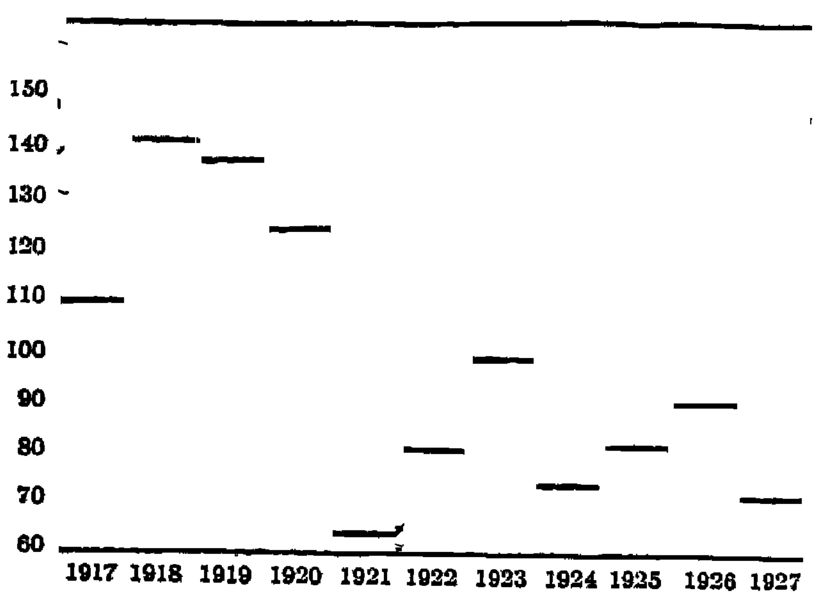
[27] Adapted from Sumner H. Slichter, "Market Shifts, Price Movements, and Employment," *American Economic Review Supplement*, XIX, No. 1 (March, 1929), 5–22.

sions, the building trades, public utilities, hotels, clerical work, highway transportation, the distributive occupations, the repair trades, some forms of personal service, and bootlegging. These increases have



A NEW LOW LEVEL OF EMPLOYMENT

The above chart, prepared by the American Association for Labor Legislation from official New York State statistics, shows the trend of factory employment in New York City from 1917 to the beginning of 1928. It shows a new low level of employment in 1927, lower even than that of the depression year of 1921, with indication of a still further decline.

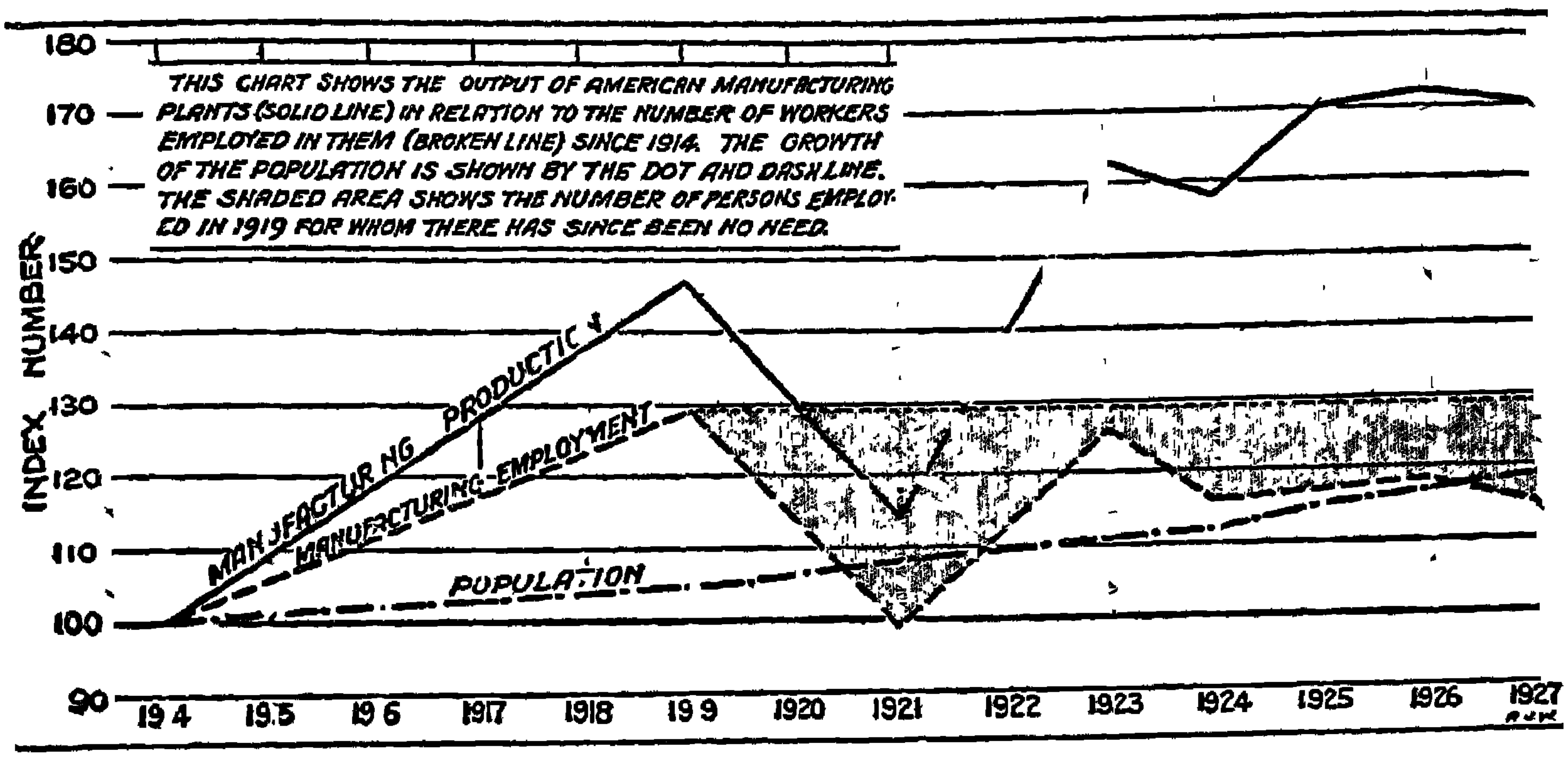


AN INDEX TO LOCAL DEMAND FOR WORKERS

The above chart, prepared by the American Association for Labor Legislation from a study of Help Wanted advertisements in the *New York World* from 1917 to 1928, shows that the demand by employers for help has fallen off to a point nearly as low as the low point in the severe depression of 1921. Help Wanted ads are a significant gauge of local employment conditions, particularly since they include demands for domestic and clerical, or "white collar" workers, in addition to factory employees.

probably exceeded the drop in manufacturing, railroading, and farming. Between 1920 and 1928, however, the population of the country increased by about 13,600,000. These facts indicate that it is at least probable that unemployment during the last year has been greater than at any time since 1924 and possibly greater than at any time since 1922. Some estimates place the increase between 1923 and the

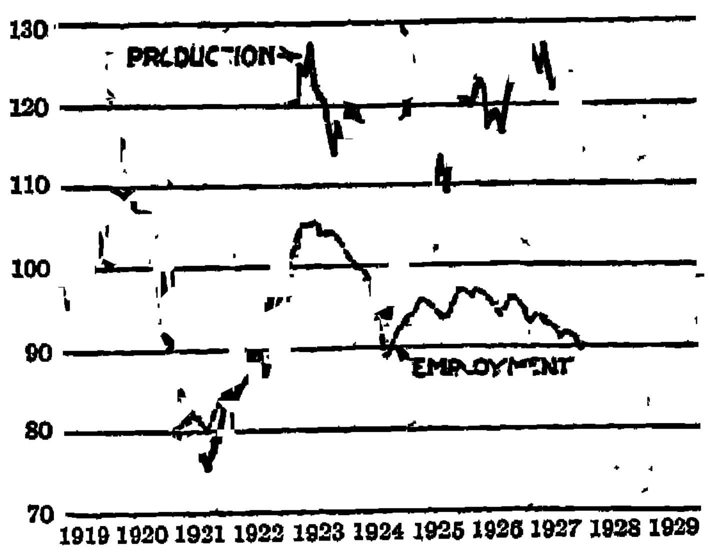
beginning of 1928 as high as 3,000,000; others as low as 700,000. It is a striking commentary upon the state of our information that such serious disagreement can exist.



New York Times

INDUSTRY IS PRODUCING MORE GOODS WITH FEWER WORKERS

The above chart, from an article in the *New York Times* entitled "March of the Machine Makes Idle Hands" by Evans Clark, graphically indicates the new "technological" unemployment said to be due to the increasing introduction of labor-saving methods and machinery.



Courtesy National City Bank

THE WIDENING GAP BETWEEN PRODUCTION AND EMPLOYMENT

The above chart showing the trend of production and of employment from official figures of the Federal Reserve Board strikingly reveals the "new" unemployment with production of goods increasing and the number of workers employed decreasing.

The recent shrinkage in factory, railroad, and agricultural employment has not been caused by a drop in production. On the contrary, it has occurred despite a substantial expansion of physical out-

put. In this respect it differs from the more familiar contractions in employment which accompany seasonal and cyclical slumps.

The rapid growth of physical output per man has been eagerly seized upon as an explanation for the displacement of labor. But although greater output per worker is important in explaining the tendency of employment in farming, manufacturing, railroading, and mining to shrink or to remain stationary, it is not in itself *the* explanation. The industries in which the effectiveness of labor has grown most rapidly are not necessarily those in which employment has diminished, and many important decreases in factory employment appear to be attributable to causes other than greater output per worker.

If one examines the industries in which employment has diminished most, it will be found that, as a rule, they are ones which have suffered from rapid and even sudden contraction of their markets.

My explanation of the falling or stationary employment in farming, manufacturing, railroading, and mining falls into two parts. The first is the reluctance of the public to increase its expenditures for the products of these branches of industry. The decreasing outlay for the products of farms, factories, railroads, and mines enables us to understand the relationship between the growing effectiveness of labor and the shrinkage of employment in these industries. Employment has diminished or has remained stationary, not simply because labor has become more productive but because its growing effectiveness has been coupled with a pronounced reluctance on the part of the public to spend more for agricultural products, manufactured goods, minerals, and railroad service.

The second part of my explanation of the shrinkage or stationary employment in farming, manufacturing, railroading, and mining is to be found in the movements of (1) wages, (2) the prices of producers' goods, and (3) long-time interest rates. All of these prices have fallen since 1920, but the relatively greater drop of producers' goods and interest rates has made it profitable for employers to shift to a combination of productive factors which involves the use of more capital and of less labor.

5. HOURS OF WORK[28]

I. THE DANGERS OF LONG HOURS

- A. Bad Effects of Long Hours on Health
  - 1. Relation of fatigue to disease
    - a) General predisposition to disease
    - b) Fatigue and infectious diseases
    - c) Fatigue and nervous diseases
      - (1) Nervous diseases and statistics of foreign sickness insurance societies
      - (2) Ages of incidence
      - (3) Nervous diseases and heredity
      - (4) Nervous diseases and overstimulation
    - d) General injuries to health
    - e) Injuries to eyes and ears
    - f) Injuries to other organs or parts of the body
- B. Health-Hazards in Modern Industry
  - 1. The new strain of manufacture
    - a) Speed
    - b) Monotony
    - c) Piece-work
  - 2. Injurious physical surroundings
    - a) Bad air, humidity, extremes of temperature, noise, etc.
    - b) Exposure to dust, gases, fumes, poisons, etc.
- C. The Nature and Effects of Fatigue
  - 1. The chemical nature of fatigue
  - 2. The toxin of fatigue
  - 3. Muscular fatigue
  - 4. The greater strain on fatigued muscles
  - 5. Nervous fatigue
  - 6. The physiological function of rest
    - a) Rest needed to repair expenditure of energy
- D. Bad Effect of Long Hours on Safety
  - 1. Incidence of accidents
  - 2. Fatigue of attention
- E. Bad Effects of Long Hours upon Morals
  - 1. General loss of moral restraints
  - 2. Growth of intemperance
- F. Bad Effects of Long Hours on General Welfare
  - 1. State's need of preserving health
  - 2. Injuries to family life and the community

[28] Adapted by permission from Felix Frankfurter and Josephine Goldmark, *The Case for the Shorter Work Day*, I, iii–v. (Reprinted by National Consumers' League.)

- II. Benefits of Short Hours
  - A. Good Effect on Morals: Growth of Temperance
  - B. Good Effect on General Welfare
    - 1. General benefit to society
    - 2. Benefit to leisure and recreation
      - *a*) The experience of Australasia
  - C. Benefit to Citizenship
    - 1. Preparedness:
      - *a*) Political: the citizen as voter
      - *b*) Social: Americanization of the foreign-born
      - *c*) Military: the citizen as soldier
- III. Economic Aspect of Reducing Hours
  - A. General Benefit to Commercial Prosperity
  - B. Effect on Production
    - 1. Superior output in shorter hours
      - *a*) Some recent instances
      - *b*) Textile trades: cotton, wool, linen, jute
      - *c*) Metal trades: iron and steel, tin plate
      - *d*) Mines and quarries: coal, slate, etc.
      - *e*) Granite and stone cutting
      - *f*) Glass and optical instruments
      - *g*) Chemicals
      - *h*) Cigars
      - *i*) Shoes
      - *j*) Miscellaneous instances
      - *k*) General comments
    - 2. Shorter hours increase efficiency on the part of the workers
    - 3. Shorter hours lead to improvement in management
    - 4. Relation of short hours to cost of production
    - 5. Long hours reduce efficiency and result in inferior output
  - C. Relation to Wages
  - D. Relation to Regularity of Employment
- IV. Uniformity of Restriction Needed for Justice to Competing Employers

6. DISADVANTAGES CONNECTED WITH FREEDOM OF CONTRACT[29]

[Note.—Although some of the specific items in the following have been lightened by later laws and interpretations, the general impression left by the selection is trustworthy.]

[29] Taken by permission from John Dewey and J. H. Tufts, *Ethics*, pp. 505–6, note. (Henry Holt & Co., 1910.)

The list appended was bulletined at the Chicago Industrial Exhibit of 1906 and reprinted in *Charities and the Commons.*

What "Freedom of Contract" has meant to Labor:

1. Denial of eight-hour law for women in Illinois.

2. Denial of eight-hour law for city labor or for mechanics and ordinary laborers.

3. Denial of ten-hour law for bakers.

4. Inability to prohibit tenement labor.

5. Inability to prevent by law employer from requiring employee, as condition of securing work, to assume all risk from injury while at work.

6. Inability to prohibit employer selling goods to employees at greater profit than to non-employees.

7. Inability to prohibit mine owners screening coal which is mined by weight before crediting same to employees as basis of wage.

8. Inability to legislate against employer using coercion to prevent employee becoming a member of a labor union.

9. Inability to restrict employer in making deductions from wages of employees.

10. Inability to compel by law payment of wages at regular intervals.

11. Inability to provide by law that laborers on public works shall be paid prevailing rate of wages.

12. Inability to compel by law payment of extra compensation for overtime.

13. Inability to prevent by law employer from holding back part of wages.

14. Inability to compel payment of wages in cash; so that employer may pay in truck or scrip not redeemable in lawful money.

15. Inability to forbid alien labor on municipal contracts.

16. Inability to secure by law union label on city printing.

Labor representatives speak of "the ironic manner in which the courts guarantee to the workers: The right to be maimed and killed without liability to the employer; the right to be discharged for belonging to a union; the right to work as many hours as employers please and under any considerations which they may impose." The "irony" is, of course, not intended by the courts. It is the irony in-

herent in a situation when rules designed to secure justice become futile if not a positive cause of injustice, because of changed conditions.

C. Position of the Worker as a Producer: Remedial Action by Worker and Community

The fears and insecurities sketched in the preceding section have of course led to much activity of a remedial nature. The workers themselves, being vitally interested, have developed certain attitudes toward their participation in production and have also developed certain institutions (especially the union) for use in the struggle in which they find themselves. The employers have taken coresponding action, partly in opposition to the demands of labor, and partly in the direction of increasing the security of the workers. And society at large, moved partly by a consciousness of the significance of the issue for general social welfare and partly by the insistence of the interested parties, is also taking action. All these attitudes and activities profoundly affect productivity.

We shall do well, at this stage of our study (some of the issues will arise again later), to keep our minds open and refrain from passing final judgment upon the attitudes, activities, and institutions which we are now to survey. Our present task is to see the situation, appraise the causes, and take cognizance of the structures arising in our society to meet the needs of the case. In particular our present task looks toward understanding the effects of all these matters upon productivity in our gain ordered society.

In this section it is especially important to direct one's consideration of the readings toward certain[29a] fundamental issues:

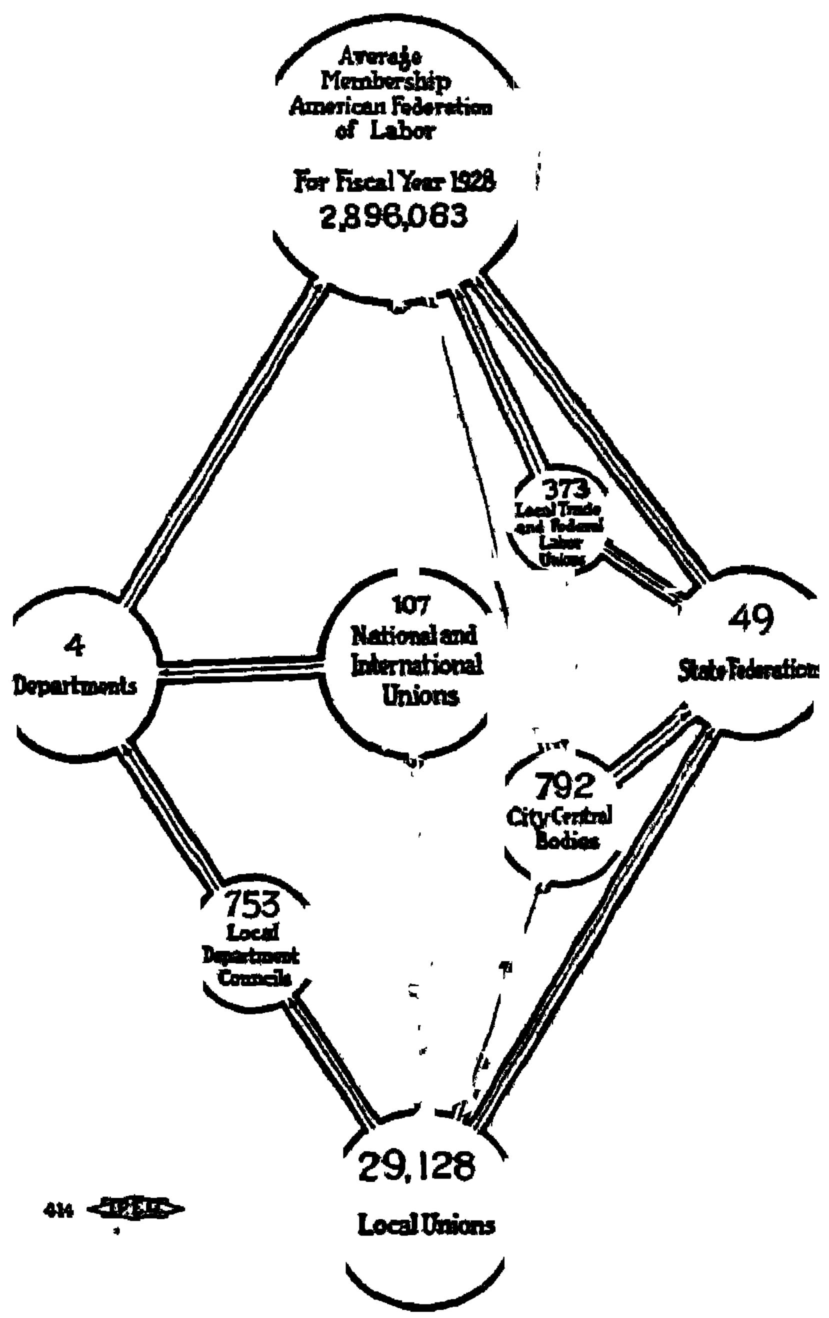
1. In what respects do the union activities of workers seem pointed toward greater productivity, and in what respects do they seem pointed toward lessened productivity?
2. Do "the principle of uniformity" and "the standard rate" tend toward greater or smaller productivity under the conditions of a work-contract-wage-system?
3. In what particulars is "society" moving toward a diminution of the fears and insecurities of the worker? Wherein may such actions be expected to promote productivity?

[29a] A more detailed statement of issues may be found in *Outlines of the Economic Order*, pp. 131–36. (The University of Chicago Press.)

4. Why is the "social minimum" especially important in a society which relies upon individual initiative?
5. As regards labor, what are the chief elements or features of a desirable social minimum?

1. LABOR UNION STRUCTURAL TYPES[30]

1. *The craft union.*—A craft union in its pure form consists of persons following a particular calling or occupation, possessing in



ORGANIZATION CHART OF THE AMERICAN FEDERATION OF LABOR

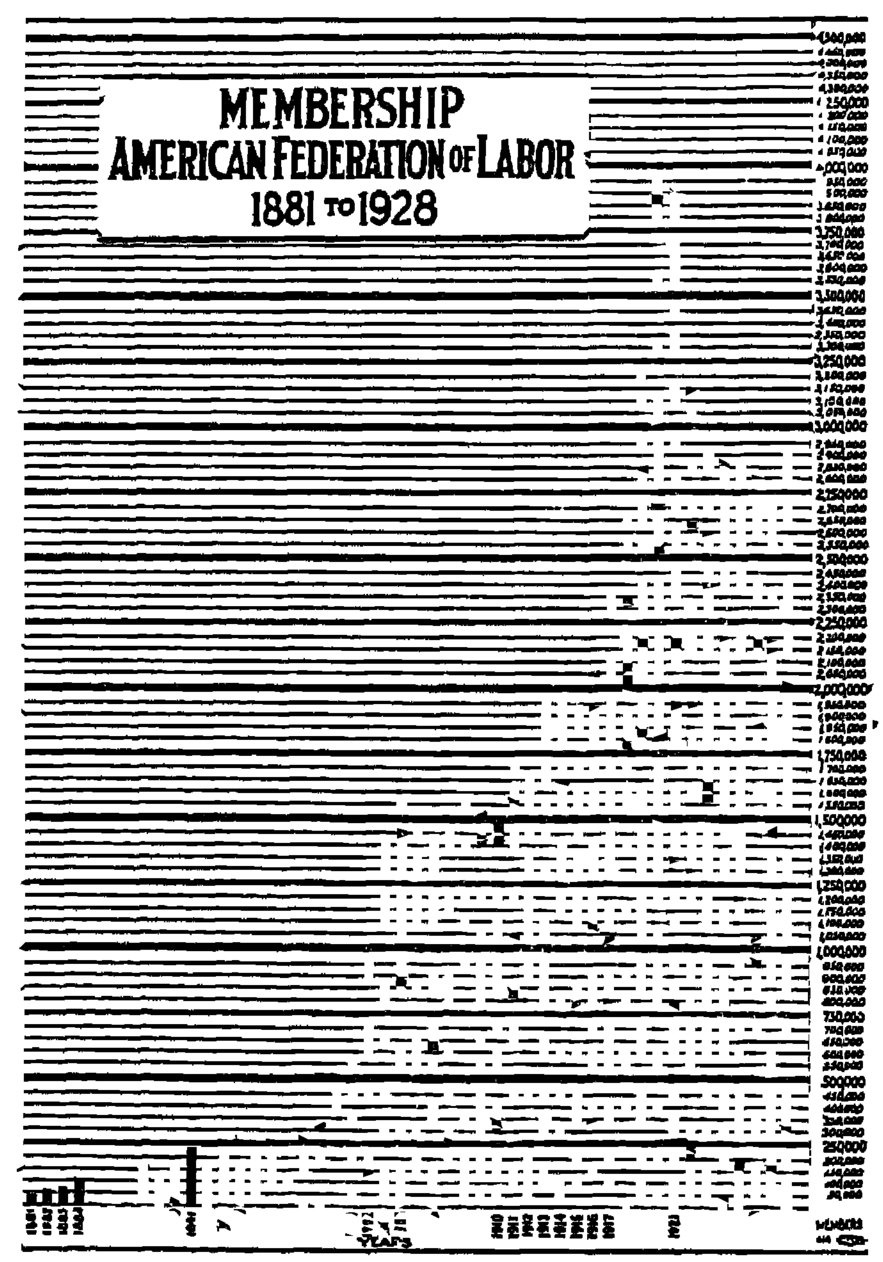
(Taken from the *Report of the Executive Council of the American Federation of Labor to the Forty-eighth Annual Convention* [1928], p. 8.)

common a certain skill, and aiming in common at a certain set of conditions of employment. Often, however, the craft union form does not

[30] Adapted by permission from G. D. H. Cole, *An Introduction to Trade Unionism,* pp. 13–18, as quoted in Douglas Hitchcock, and Atkins, *The Worker in Modern Economic Society.* (Trade Union Series, No. 4. Published by the Labour Research Department, 25 Tothill St., Westminster; and by George Allen and Unwin, Ltd., 20 Museum St., London, W.C.)

appear in such purity as this, and we find associated in a single union a number of kindred grades. This is the case, for instance, with the boiler-makers, who include angle-iron smiths, platers, caukers, rivet-ers, and various other sections.

2. Akin to the craft basis of organisation is a basis of organisation which it is not easy to define. I will call it for the moment *mate-*



THE GROWTH OF THE AMERICAN FEDERATION OF LABOR

rial trade unionism. This form of organisation follows the line not of the precise craft followed by the worker concerned, but of the material on which he may happen to be working, and it is interesting to note that this is actually the form of organisation adopted by the largest trade union in Germany—the German Metal-Workers' Union.

3. Broadly contrasted with craft unionism in all its various forms is *union by industry,* which again may assume a number of different forms. Advocates of union by industry, broadly speaking, set out to combine in a single union all those workers who co-operate in producing a common product or type of product, or in rendering a common

service, irrespective of the degree of skill which they happen to possess. Thus they aim at creating one union for the railway industry, one union for the mining industry, one union for the building industry, and so on. This form of organisation, however, passes over easily into a form of organisation which aims at copying exactly the present capitalist structure of industry and at grouping in a single union all those persons who work under a common employer or group of employers.

4. A further type of union is that which follows the line of sex.

5. There is one further type of union which it is only necessary to mention in order to dismiss it with a word. This is the type which endeavours to include in a single organisation all workers irrespective of trade, craft, industry, sex, or any other consideration, on the basis merely of their own status within the capitalist system. Of this type is the organisation known as the Industrial Workers of the World.

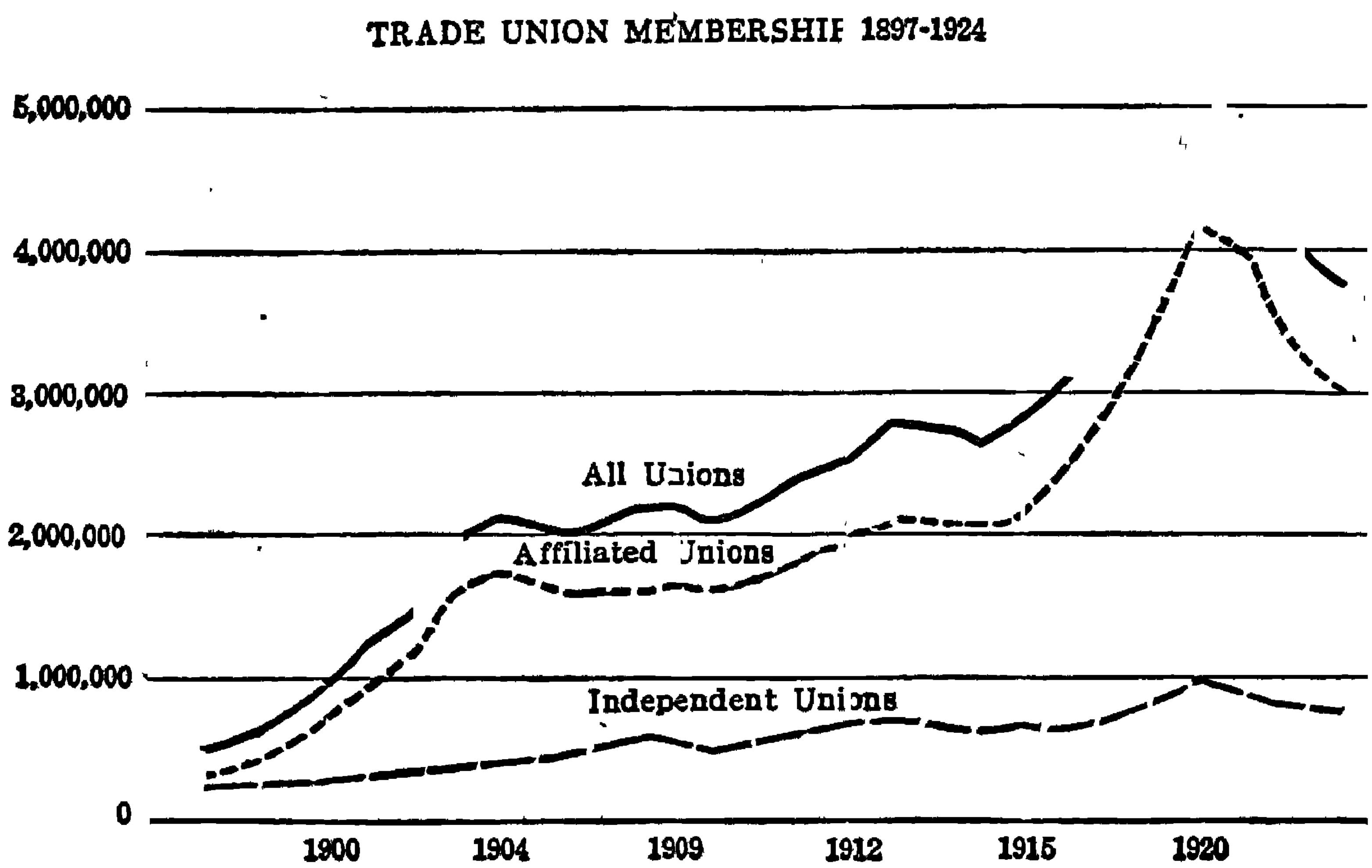
2. LABOR UNION FUNCTIONAL TYPES[31]

There are seemingly four distinct types, two of which present dual variations.

The first and perhaps most clearly recognizable functional type may be termed *business unionism.* Business unionism appears most characteristically in the programs of local and national craft and compound craft organizations. It is essentially trade-conscious rather than class-conscious. That is to say, it expresses the viewpoint and interests of the workers in a craft or industry rather than those of the working class as a whole. It aims chiefly at more here and now for the organized workers of the craft or industry, in terms mainly of higher wages, shorter hours, and better working conditions, regardless for the most part of the welfare of the workers outside the particular organic group, and regardless in general of political and social considerations except in so far as these bear directly upon its own economic ends. It regards unionism mainly as a bargaining institution and seeks its ends chiefly through collective bargaining supported by such methods as experience from time to time indicates to be effective in sustaining and increasing its bargaining power. Thus it is likely to be

[31] Adapted by permission from Robert F. Hoxie, "Trade-Unionism in the United States: General Character and Types," *Journal of Political Economy,* XXII (1914), 211–16.

exclusive, that is, to limit its membership by means of the apprenticeship system and high initiation fees and dues, to the more skilled workers in the craft or industry or even to a portion of these. In method, business unionism is prevailingly temperate and economic. It favors voluntary arbitration, deprecates strikes, and avoids political action, but it will refuse arbitration and resort to strikes and poli-



The Trend of Unionism in the United States, 1897–1923

(Taken from Wolman, *The Growth of American Trade Unionism*, p. 63.) "Affiliated union" means affiliated with the American Federation of Labor.

tics when such action seems best calculated to support its bargaining efforts and increase its bargaining power. This type of unionism is perhaps best represented in the programs of the railway brotherhoods.

The second union functional type seems best designated by the terms *friendly or uplift unionism.* Uplift unionism, as its name indicates, is characteristically idealistic in its viewpoint. It may be trade-conscious or broadly class-conscious, and at times even claims to think and act in the interest of society as a whole. Essentially it is conservative and law-abiding. It aspires chiefly to elevate the moral, intellectual, and social life of the worker, to improve the conditions under which he works, to raise his material standards of living, give him a

sense of personal worth and dignity, secure for him the leisure for culture, and insure him and his family against the loss of a decent livelihood by reason of unemployment, accident, disease, or old age. In method, this type of unionism employs collective bargaining but stresses mutual insurance, and drifts easily into political action and the advocacy of co-operative enterprises, profit-sharing, and other idealistic plans for social regeneration. The nearest approach in practice to uplift unionism is perhaps to be found in the program of the Knights of Labor.

As a third distinct functional type, we have what most appropriately may be called *revolutionary unionism*. It is distinctly class-conscious rather than trade-conscious. It repudiates, or tends to repudiate, the existing institutional order and especially individual ownership of productive means, and the wage system. It looks upon the prevailing codes of right and rights, moral and legal, as in general fabrications of the employing class designed to secure the subjection and to further the exploitation of the workers. In government it aspires to be democratic, striving to make literal application of the phrase *vox populi, vox Dei*.

Of this revolutionary type of unionism there are apparently two distinct varieties. The first finds its ultimate ideal in the socialistic state and its ultimate means in invoking class political action. The second variety repudiates altogether socialism, political action, collective bargaining, and contract. It looks forward to a society based upon free industrial association, and finds its legitimate means in agitation rather than in methods which look to immediate betterment. Direct action and sabotage are its accredited weapons, and violence its habitual resort. These varieties of the revolutionary type may be termed respectively socialistic and quasi-anarchistic unionism. The former is perhaps most nearly represented in the United States by the Western Federation of Miners, the latter by the Industrial Workers of the World.

Finally in the union complex it seems possible to distinguish a mode of action sufficiently definite in its character and genesis to warrant the designation *predatory unionism*. This type, if it be truly such, cannot be set apart on the basis of any ultimate social ideals or

theory. Its distinguishing characteristic is the ruthless pursuit of the thing in hand by whatever means seem most appropriate at the time regardless of ethical and legal codes or the effect upon those outside its own membership. It may employ business, friendly, or revolutionary methods. Generally its operations are secret and apparently it sticks at nothing.

Of this assumed union type also there appears to be two varieties. The first may be termed *hold-up unionism*. In reality it has no abiding principles and no real concern for the rights or welfare of outsiders. Prevailingly it is exclusive and monopolistic. Generally it is boss-ridden and corrupt, the membership for the most part being content to follow blindly the instructions of the leaders so long as they "deliver the goods." Frequently it enters with the employers of the group into a double-sided monopoly intended to eliminate both capitalistic and labor competition and to squeeze the consuming public.

The second variety of predatory labor organization may be called, for want of a better name, *guerilla unionism*. This variety resembles the first in the absence of fixed principles and in the ruthless pursuit of immediate ends by means of secret and violent methods. It is to be distinguished from hold-up unionism, however, by the fact that it operates always directly against its employers, never in combination with them, and that it cannot be bought off. It is secret, violent, and ruthless, seemingly because it despairs of attaining what it considers to be legitimate ends by business, uplift, or revolutionary methods.

3. LABOR UNION POLICIES AND METHODS

A. THE STANDARD RATE[32]

This conception of a standard rate is, as we need hardly explain, an indispensable requisite of collective bargaining. Without some common measure, applicable to all the workmen concerned, no general treaty with regard to wages would be possible. This conception of a consistent standard of measurement the trade union seeks to extend from establishments to districts, and from districts to the whole area of the trade within the kingdom.

[32] Adapted with permission from Sidney and Beatrice Webb, *Industrial Democracy*, pp. 280–334. (Longmans, Green & Co., 1914.)

This trade unionist insistence on a standard rate has been the subject of bitter denunciation. The payment of "bad and lazy workmen as highly as those who are skilled and industrious," "setting a premium on idleness and incapacity," "destructive to the legitimate ambition of industry and merit," that "worst kind of Communism, the equal remuneration of all men," are only samples of the abusive rhetoric of capitalists and philosophers on the subject.

Such criticisms are beside the mark. A very slight acquaintance with trade unionism would have shown these writers that a uniform standard rate in no way implies equality of weekly wages, and has no such object.

The misapprehension arises from a confusion between the rate of payment and the amount actually earned by the workman. What the trade union insists on, as a necessary condition of the very existence of collective bargaining, is a standard *rate* of payment for the work actually performed. But this is consistent with the widest possible divergence between the actual weekly incomes of different workmen. When the standard rate takes the form of a schedule of piecework prices, it is clear that there can be no question of equalising the actual earnings of different workmen. Nor can it be assumed that in the industries in which the trade union rate is not based on piecework, but takes the form of a definite standard wage per hour, this necessarily implies equality of remuneration. Even where workmen in such trades put in the same number of hours, their weekly incomes will be found to differ very materially. Thus whilst ordinary plumbing, bricklaying, and masonry is paid for at uniform rates per hour, directly the job involves any special skill, the employer finds it advantageous to pay a higher rate, and the trade union cordially encourages this practice.

In modern industry the settlement of the hours of labor differs in an essential particular from that of the rate of payment for the work done. In the absence of any form of collective regulation, the rates of wages are determined by individual bargaining between the capitalist employer and his several "hands" and a distinct and varying agreement as to the amount of remuneration is made with each operative in turn. This is seldom the case with regard to the length and distribution of the working day. . . . . Instead of each individual being able

to work as he chooses, the whole establishment finds itself by the nature of things subject to a common rule. A common standard, compulsory in its application, is economically inevitable. The only question is how and by whom the uniform rule shall be determined. Under the circumstances of modern industry, the employer's decision, because of his costly plant, will perpetually be biased in favor of lengthening the working day. If each workman is free to conduct what bargain he chooses with regard to his working hours, the employers will, it is contended, be able to compel all the others to accept the same longer working day.

B. THE UNION LABEL[33]

The trade-union label, using the term in its widest sense, is used in three forms: (*a*) a label to mark a product, (*b*) a shop card for display in a place of business, and (*c*) a button for personal use.

Whether or not a trade union can establish a demand for goods bearing its label depends upon a variety of factors: (1) on whether the goods are bought by unionists or by other classes in the community; (2) on whether the goods are ordinarily purchased by men or women; (3) on whether the goods are of such a character or are purchased under such circumstances as to make it possible for other unionists to know whether the unionist purchasing the goods is buying union or non-union goods, and (4) on whether the purchase is one frequently repeated or only one made at considerable intervals.

C. THE BOYCOTT[34]

Boycotts may be divided into *negative* and *positive* boycotts. The primary purpose of negative boycotts is to secure for "fair" firms the patronage of labor and its friends. Indirectly, they divert trade from "unfair" employers. In the prosecution of this form of boycotts, a *union label* is usually placed on goods as a guarantee to the trade unionists and to the public generally that the goods are produced under conditions favorable to the unions. "White" or "fair" lists which announce to the public those who have complied with trade union conditions are also printed and distributed.

[33] Adapted by permission from E. R. Spedden, *The Trade Union Label*, pp. 16 ff. (Johns Hopkins Press, 1910.)

[34] Taken by permission from H. W. Laidler, *Boycotts and the Labor Struggle*, pp. 60–68. (John Lane Co., 1914.)

The *positive boycott* generally takes the form of the *"unfair"* or the *"We don't patronize"* list and the *boycott proper.*

The unfair list is a list of those firms which, from the standpoint of the trade unionists, are unfair to labor. The list is published for the most part in trade union periodicals, or posted at trade union headquarters. Publication in the papers of one trade often leads through "courtesy" to publication in other trade journals. Unionists are supposed to cease all dealings with those whose names thus appear. Since February, 1908, following the Danbury Hatters and Buck's Stove decisions the "We don't patronize" list has been of little importance.

The boycott proper may be divided into the primary, the secondary and the compound boycott. A primary boycott may be defined as a simple combination of persons to suspend dealings with a party obnoxious to them, involving no attempt to persuade or coerce third parties to suspend dealings also. Thus, if workmen in one industry go on a strike against a firm and agree to refuse to purchase any product from that firm, without endeavoring to persuade others to do likewise, a primary boycott will be the result. This form, however, is rarely used in labor disputes as it is comparatively ineffective.

A *secondary* boycott may be defined as a combination of workmen to induce or *persuade* third parties to cease business relations with those against whom there is a grievance. A *compound* boycott appears when the workmen use *coercive* and *intimidating* measures, as distinguished from mere persuasive measures in preventing third parties from dealing with boycotted firms.

Finally a *tertiary* or very indirect boycott may be instituted against those citizens who continue to purchase from stores selling "unfair" supplies. In these cases actual violence is comparatively rare.

D. THE COURSE OF STRIKES IN THE UNITED STATES FROM 1881 TO 1921[35]

The United States Bureau of Labor defined a strike as "a concerted withdrawal from work by a part or all of the employees of an establishment or several establishments to enforce a demand on the part of employees" while a lockout was defined as "a refusal on the

[35] Taken from an unpublished manuscript by Paul H. Douglas, as quoted in Douglas, Hitchcock, and Atkins, *The Worker in Modern Economic Society*.

part of an employer or several employers to permit a part or all of the employees to continue at work, such refusal being made to enforce a demand on the part of employers." During the twenty-five years from 1881 to 1905, strikes were twenty-five times as numerous as lockouts and involved ten times as many workers. Since then the relative proportion of lockouts to strikes has still further diminished.

These statistics show that during the seven years from 1915 to 1921 inclusive, the average number of strikes was slightly over six times as great as during the five years from 1881 to 1885, and between two and three times as great as the average number of strikes which occurred during the years of 1886–90. Even more notable was

THE MOVEMENT OF STRIKES IN THE UNITED STATES, 1881–1921

Period	Average Number Per Year of		Relative Number (1881–85=100) of	
	Strikes	Strikers	Strikes	Strikers
1881–85	498	124,005	100	100
1886–90	1,336	255,863	268	206
1891–95	1,377	278,868	276	225
1896–1900	1,351	281,275	271	227
1901–5	2,793	406,639	561	324
1915–21	3,043	1,547,087	611	1,248
Variously estimated	....	2,395,971	....	1,932
Variously estimated	....	1,744,502	....	1,407
Variously estimated	....	1,632,222	....	1,316

the increase in the number of strikers. Counting only those actually reported with no allowance for workmen involved in the eight thousand strikes whose numbers were not reported, they totaled nearly twelve and a half times as many as during the first period while it is probable that in actuality they were somewhere between thirteen and fourteen times as numerous.

Such statistics do not by themselves, however, give an adequate picture of the real movement of strikes. It is not until they are compared with the increase in the industrial population during these years that their real significance is disclosed. An increase in the total number of strikes or strikers would naturally result from a mere increase in the number "exposed" to strikes, i.e., industrial wage-earners and, hence, would not of itself indicate whether the *rate* of striking was or was not increasing.

But even the relative number of strikes and strikers in proportion to the industrial population is not sufficient in itself to indicate the relative tendency of strikes to interfere with the course of industry. For duraton is just as much of a factor in the virulence of strikes as is

RELATIVE AVERAGE ANNUAL STRIKE RATES IN RELATION TO NUMBER OF INDUSTRIAL WAGE-EARNERS. BY PERIODS, 1881-1921

Period	Average Annual Rate Per 1,000,000 Industrial Wage-earners		Relative Rates (1881–85 = 100)	
	Strikes	Strikers	Strikes	Strikers
1881–85	84	20,990	100	100
1886–90	193	37,050	230	177
1891–95	167	33,880	199	161
1896–1900	170	29,030	167	138
1901–5	240	34,900	286	166
1915–21	179	90,846	213	433
Variously estimated	....	140,690	....	671
Variously estimated	....	102,440	....	488
Variously estimated	....	95,840	....	457

their scope and frequency. The following table shows the average annual duration of strikes by periods from 1881 on.

AVERAGE DURATION OF STRIKES, 1881–1921

Period	Average Duration in Days	Relative Durations (1881–85 = 100)
1881–85	22.7	100
1886–90	23.4	103
1891–95	26.8	118
1896–1900	21.5	95
1901–5	28.2	124
1915–21	28.8	127

What have been the causes of strikes? During the quarter-century from 1881 to 1905, 33 per cent were caused by demands for increased wages alone and approximately 6 per cent to ward off wage cuts. In another 26 per cent of the cases, wages were a partial cause. Ten per cent had as their sole cause a demand for a reduction in hours while this was a partial cause in 18 per cent more. Eliminating all double counting, 63 per cent were due either to wages or hours. Some

24 per cent were caused by demands for the recognition of the union —a percentage that was much higher during the years 1901–5 than before. Only 4 per cent were sympathetic and less than 1 per cent were due to jurisdictional disputes, although in the earlier periods sympathetic strikes had been relatively much more common. During the period 1915–21, the percentage of strikes caused by wages and hours decreased slightly and there was apparently a still further decrease in the proportion of sympathetic strikes compared with that for the earlier period as a whole.

Forty-nine per cent of the strikes initiated by the unions, during the twenty-five years from 1881 to 1905, succeeded, 16 per cent partially succeeded, and 35 per cent failed. It is interesting to note that the percentage of union successes was actually higher during the depression years 1893–97 than during the period as a whole, while for non-union strikes it was lower. The reports for the years 1916–21, while probably not as trustworthy as those for the earlier years, indicate that only 29 per cent of all strikes succeeded, 33 per cent were compromised, 33 per cent failed, and in 5 per cent the men returned pending arbitration. The percentage of unsuccessful strikes was especially high in 1921, amounting to 53 per cent.

E. LIMITATION OF OUTPUT[36]

The ground on which workingmen oftenest defend the restriction of output is the need of protecting themselves from excessive and injurious exertion. The stress and strain of work at high tension is declared in some trades to have reached a point which noticeably shortens the working life of the men. The workingmen not infrequently allege as an additional argument against too great rapidity that it is incompatible with excellence of work. A personal motive, which unquestionably plays its part at times, though it may not often be avowed, is the desire to "nurse a job"—to make one's employment last.

It may be that broader economic ideas have the greatest real influence in determining the limitation of work. These ideas have as their center the desire to maintain and to increase wages. There are several ways in which the limitation is thought by some workmen to contribute to this result.

[36] Adapted from *Report of the Industrial Commission,* XIX, 817–20.

If a few individuals increase their speed, their pace tends, it is declared, to become the standard pace in the trade. If the work is by the day, there is no tendency to a corresponding increase in wages. The workmen assert that the case is nearly the same, in the long run, if the work is by the piece. Under piece rates there is, of course, an increase of daily wages at first if the pace is increased. But every employer has in his mind a more or less definite standard of just wages for each kind of service. If the piece workers begin to earn more than he considers fair, he will cut down the piece prices. In the end the men will work harder than before, and will get no more for it. Here, therefore, as well as under the day-wage system, the standard rate is best maintained, the workmen think, by keeping within certain standard limits of performance.

In a less direct way the limitation of output is conceived to affect wages by providing work for the unemployed. The competition of the unemployed is the great obstacle in the way of raising wages. If work can be found for them, jobs may be made to hunt men instead of men's hunting jobs. If those who are employed work excessively, it is men's hunting jobs.

Another economic argument is based upon the idea of overproduction. It is because more goods are made than can be bought by people who want to buy them, it is argued, that the mills have to stop working, and widespread industrial depression occurs. There is yet another form of economic argument, which seems to be especially prominent in Great Britain, and which doubtless affects in a less degree the policy of some American unions. In it, labor is conceived as a commodity, offered in the market like other commodities. Whatever increases the supply tends to lower the price. But if four men do each a fourth more work than has been customary in the occupation, the effect is exactly the same, it is argued, as if the labor of a new man were thrown upon the market. The market value of each unit of labor will be lowered. Employment will be harder to get, and less regular.

F. THE CLOSED SHOP[37]

The unions themselves look to complete organization and the maintenance of a union-shop as the best guarantee that prompt readjustment to new conditions will be made, standards preserved, and

[37] Adapted from Warren B. Catlin, *The Labor Problem*, pp. 344–45. (New York and London: Harper & Bros., 1926.)

agreements kept inviolate. They ask for this measure of control in order that they may enforce discipline. Here the issue is clearly joined with that large group of employers represented at the President's First Industrial Conference in 1919, who, while professing no desire to discriminate against union men—might, in fact, hire one occasionally if they could not find anyone else—declare for the "open shop" and the right of the employer to hire whom he pleases, regardless of whether or not he belongs to any union or association. The demand for the union-shop that only members of the union shall be employed or that non-union men who are employed shall be required to join the union within a reasonable time—is chiefly a result of the uncertain, partially recognized, probationary status of the union that still prevails in many industries. It is not so commonly insisted upon in Great Britain, nor in certain industries like railroading and stovefounding in the United States, where the union has long been recognized as having a right to speak for the workers of all grades, where the employer is therefore known to be well disposed, where the entrance to the trade is already fairly well protected by a barrier of skill or an established apprenticeship system, and, finally, where trade agreements provide for the review of discharges or other possible forms of discrimination by a grievance committee. Where these conditions do not hold, the union-shop is felt to be the only security against a rear attack by an employer or employers' association that has no deep-rooted affection for the union and is only biding his or its time until a more favorable opportunity comes to dislodge it.

4. REMEDIES FOR CERTAIN COMMON-LAW DOCTRINES[38]

We must begin with a word or two about the common law in personal injury cases generally. If one person injures another, unintentionally but through want of due care (and due care is what the average prudent man would use in similar circumstances), he is civilly liable to the injured one for the amount of harm, estimated in money, which his want of care has caused. This seems a natural and fair adjustment of burdens. When one is unduly careless, and thereby hurts another, he should make up for it in so far as money can.

[38] Adapted by permission from Crystal Eastman, *Work-Accidents and the Law*, pp. 169–88. (Charities Publication Committee, 1910.)

There are three important additional features of this law:

First, contributory negligence on the part of the injured person defeats recovery.

Second, as a rule of negligence—and it is important to bear this in mind—a master is responsible for the negligence of his servant while engaged in the master's work. This is on the principle of "respondeat superior." It is the master who is having the work done; he must insure its being done with reasonable care. Whether he does the work himself, or through an agent, the burden of responsibility is manifestly well placed.

Third, the burden of proving negligence is upon the plaintiff; of proving contributory negligence upon the defendant.

Now in the application of this general law to an employer's liability for negligence which results in injury to his employees while they are carrying on his work, some rather material modifications and changes occur. All these modifications are based on one idea. The law holds that the employer is in a different relation to his employees, because they have made a contract with him in which certain elements are implied. The law assumes that the two parties are free and on an equal footing in making this contract. It is the contract of hire. The servant is not obliged to work for the master, he can take work or leave it, as he likes; but if he takes the work he makes a contract in which the law implies that he assumes certain risks. (1) He assumes the risk of all the ordinary dangers of the employment. (2) He assumes the risk of all extraordinary dangers, such as those which arise from defective machinery and an unsafe place to work or from hasty and dangerous methods, if he knew about these, or might reasonably be expected to know about them and accepts the work in spite of them, or if he finds out about them, or might have found out about them with the exercise of ordinary care, and continues working in spite of them. (3) Finally, he assumes the risk of all dangers arising from the carelessness, ignorance, or incompetency of his fellow-employees.

1. The first is simple and, comparatively speaking, reasonable. In a large number of modern industries certain accidents are inevitable. It is not as safe to mine coal, make steel rails, or manufacture explosives, as it is to practice law or dig potatoes. If a man chooses one calling rather than another, the danger is his own lookout.

However, it is not merely the risk of accidents happening in spite of every safety precaution and protection, which the employee assumes; he assumes the risk of the work as it is ordinarily carried on. Thus, a telephone lineman gets a shock from an uncovered electric light wire that he touches in passing, and this is an incident of his employment. Or a laborer working in a quarry is badly injured by a heavy stone falling on him; this is a risk which a quarry workman assumes.

2. The second exception goes farther. The employee assumes all extraordinary and unusual risks, not incident to his employment, if he knew or could reasonably be expected to have known of the danger, and continued working. He assumes all patent risks and all latent risks of which he is informed. For instance, a seventeen-year-old girl working in a laundry called the attention of a foreman to a loose board in front of the rolls where she was working. She said it interfered with her work, but made no definite complaint with regard to its danger, and she went on working. Nothing was done. Finally, while she was cleaning the machine, the loose board flew up and threw her hands between the rolls, where they were crushed. She could not recover damages for this injury, because she had assumed the risk of a condition which she ought to have known was dangerous.

There is, however, one exception to this rule of the law. If an employee, when he sees a defect or a possible danger, complains of it to his employer or to his superior who is directing the work, and if the employer or his superior promises to repair it, and if the employee relies upon the promise, and if the danger is not imminent—then the servant is relieved of his assumption of risk even though he continues to work; provided, however, that if the employee continues to work after a reasonable time has passed without the promise to repair being carried out, then he is deemed to have "waived" his objections, and "assumed the risk" again. This valuable exception is well hedged about with "ifs."

3. Finally, the employee assumes all risk due to the negligence of fellow-employees. This is the most vital distinction between the general law of negligence, and the law of negligence as between master and servant. "A master is responsible for the negligence of his servants in course of employment without regard for their reputation ex-

cept in case of fellow-servants." As between the master and a servant injured, it is only demanded of the master that he shall have taken due care in employing fellow-servants of ordinary skill and carefulness. To illustrate: Suppose a yard master in Philadelphia, by reputation a reasonably careful man, puts a car of dynamite at the end of a train of cars instead of in the middle, as the rule of the company requires, and because of this carelessness the dynamite is blown up in a collision many miles from Philadelphia. A cow browsing in a field near the track and a station agent keeping his lonely post in a small country station are both blown to pieces. Now in such a case the farmer could recover for the loss of his cow; but the station agent's widow could not recover for the loss of her husband because he was a fellow-servant of the man whose mistake or carelessness caused the accident. Yet he had no more to do with that fellow-servant's act, or with the employment of him, than the farmer's cow had.

Remedial action.[39]—The obvious defects in the common law situation have led to the passage of workmen's compensation acts by most of our states.

The rapid growth of compensation legislation, involving, as it has, the almost simultaneous enactment of laws in a number of States, has operated to prevent the adoption of any one form of law as a type, so that, although a single fundamental principle underlies the entire group of laws of this class, its expression and application present great diversity of details in the different States. This extends not only to the primary factors of the scope of the laws and the amount of compensation payable under them but also to the matter of making the laws compulsory or voluntary in their acceptance, the securing or not securing the payments of the benefits, the mode of securing where it is required, methods of administration, of election or rejection, etc.

No fixed form of analysis or summary presentation can give in complete detail the provisions of the laws under consideration. They relate not only to the compensation of accidents but to accident reporting, safety provisions, the enforcement of safety laws, the establishment of insurance systems, premium rates, investments, the

[39] Adapted from *"Workmen's Compensation Legislation of the United States and Canada as of July 1, 1926," Bureau of Labor Statistics Bulletin,* No. 423, pp. 8–11. (Government Printing Office, 1926.)

scaling of payments in cases of certain forms of negligence or their increase under certain conditions, procedure in arbitration, forms of appeal, and a great variety of subjects on which it would be impossible to generalize.

In most States (32) the employer and the employee may exercise a choice as to accepting the provisions of the compensation law. Election by the employer is presumed in a majority of the States, but in 10[40] positive action is required. Where the employer rejects the law, actions for damages may be brought without the customary common-law defenses. Where he elects to accept the provisions of the law, the acceptance by the employee is taken for granted, in the absence of rejection, except in Kentucky, where positive acceptance is required. In New Hampshire the employee may make his choice of remedy after the injury has been received. If the employer has accepted and the employee rejects the law, actions for damages are subject to the common-law defenses, except in 2 States (New Jersey and Pennsylvania), where the defenses are abrogated absolutely.

The laws are compulsory in 14 States, neither employer nor employee having the option of choosing another remedy, except in Arizona, where a workman may elect prior to the injury not to come under the act. Suit is permitted in a number of States if the employer has failed to insure or permits premiums to remain unpaid.

No law is of complete coverage, and the terms "elective" and "compulsory" apply to the laws in regard to the occupations said to be covered by the acts. Employers in other occupations than those so classed as "covered" may generally accept the terms of the acts, but forfeit no defenses by failure to do so. Such inclusion is designated as "voluntary," and may require the joint positive action of both employer and employee.

5. SOCIAL INSURANCE

A. GENERAL STATEMENT[41]

Social insurance sets to itself the task of meeting the problem of the economic insecurity of labor.

[40] Kentucky, Maine, Massachusetts, Michigan, Montana, Nevada, New Hampshire, Rhode Island, Texas, and West Virginia.

[41] Adapted by permission from W. F. Willoughby, "The Problem of Social Insurance: An Analysis," *American Labor Legislation Review,* III (1913), 159–60.

Now what are the contingencies causing this economic insecurity against which provision must be made in some way? On examination we find that a man's ability to support himself, and to make due provision for those dependent upon him, is lessened or cut off: (1) by his meeting with an accident incapacitating him, temporarily or permanently, partially or completely, for labor; (2) by his falling sick; (3) by his becoming permanently disabled for labor as the result of old age or failing powers; (4) by his death, leaving a widow, children, or others without adequate means for their support; and (5) by his inability to secure remunerative work.

To meet each of these contingencies resort has been had to the principles of insurance. Social insurance is thus a term that has been coined to serve as a collective designation of: (1) insurance against accidents; (2) insurance against sickness; (3) insurance against old age and invalidity; (4) insurance against death, or, as it is more usually called, life insurance; and (5) insurance against unemployment.

Could a just and workable plan of insurance covering these several points be worked out, the problem of the economic security of labor, one of the greatest with which society now has to deal, would be solved. Is there any social problem more fundamental or more deserving of unremitting effort?

Each of these five branches of social insurance has its own special problems and considerations; they are united only in respect to their ultimate social end. These special problems can, in each case, be distinguished, for purposes of consideration, into three distinct classes: (*a*) the social, (*b*) the administrative, (*c*) the technical. Of these the first is the most fundamental. Under this head falls the great question of upon whom shall fall the burden of making the contributions required for the support of the system. No real progress can be made until we, the public, have reached a conclusion regarding the problem of justice that is here involved. As a matter purely of right, of justice, of bringing about the widest possible distribution of welfare, how shall the financial burden entailed by the system be distributed? In seeking to reach an answer to this question we find that the choice lies between placing the burden in whole or in part upon either: (1) the beneficiary, or workman, (2) the employer, (3) the industry in which the workman is employed, or (4) the state.

B. UNEMPLOYMENT INSURANCE[42]

Unemployment insurance is a new venture in American industry. Some 15 private industrial organizations to-day have their own insurance funds and make provision for paying their workers during periods of unemployment. It has been the policy of those private firms which have unemployment insurance systems to create their own insurance funds and bear the burden of the cost themselves. Contributions are not exacted from the labor forces. The amount paid to workers varies with the different organizations. One large manufacturer in New England employing some 3,000 people guarantees to each employee 80 per cent of his weekly earnings, if he is married, and 60 per cent of his earnings, if he is single, during such periods as he is unemployed for reasons over which he has no control. One of the railroad companies pays a weekly sum of $15 to its discharged employees for a period of six weeks.

It is generally felt that company insurance funds which are supported by the management alone are more advantageous than contributory funds because of the fact that when the cost is borne by the employer he is driven to the regularization of employment and is forced to do everything in his power to prevent the discharge of workers. By making the cost of insurance a charge upon production it is to the advantage of the employer to keep his force employed as steadily as possible and thereby keep his overhead charges at a minimum.

In the Chicago men's clothing market a system of unemployment insurance has been in effect for the past six years. This system is the outgrowth of an agreement between some 400 employers and the Amalgamated Clothing Workers of America whereby both the employers and employees contribute jointly to an unemployment insurance fund from which relief is given to workers when involuntarily out of work.

Although bills proposing the compulsory insurance of workers against unemployment have in the past been submitted to the Legislatures of Massachusetts and Wisconsin, there is to-day no compulsory insurance of this type in the United States.

[42] Adapted from Isador Lubin, in *Unemployment in the United States, Hearings before the Committee on Education and Labor, United States Senate, Seventieth Congress, Second Session*, pp. 512–13. (Government Printing Office, 1929.)

Great Britain was the first country to introduce a national system of compulsory unemployment insurance. The national insurance act, 1911, made provision for insurance against unemployment in seven selected trades—building, construction, shipbuilding, mechanical engineering, iron founding, construction of vehicles, and sawmilling—covering over 2,000,000 workpeople. The scheme was extended by the munition workers' act of 1916 to include additional groups of workers who were expected to suffer from unemployment after the war, bringing the total of insured up to 4,000,000. The act of 1920, the principal act dealing with this project, brought into insurance all persons of the age of 16 and upwards employed under a contract service. Over 11,500,000 workers are now insured under this scheme. Since provision is made for dependents, it may be estimated that some 30,000,000 are directly affected by its provisions.

The British law requires that all persons between the ages of 16 and 65 who are employed under contract of service in Great Britain, including apprentices in receipt of a money payment, must be insured against unemployment. The chief classes who are excepted are persons engaged in agriculture, domestic servants in private employment, those for whom the Minister of Labor thinks insurance unnecessary because of the regularity of their employment, such as government and public corporation employees, and all persons who are not manual workers and who are receiving remuneration at a rate exceeding £250 a year.

The State contributes annually, from money granted by Parliament, an amount equal to rather less than one-third of the total contributions of employers and workmen. The contributions from the employers, the workmen, and the State together form the unemployment fund from which benefits are paid. This fund is controlled and managed by the Ministry of Labor.

The condition that the unemployed workman must make application for benefit in the prescribed manner is the very core of the scheme. He is required to register at the employment exchange the fact of his unemployment. The exchange knows or is able to ascertain whether his unemployment is due to lack of work in the establishment in which he has been engaged. It is able to find him work in his own occupation in other establishments in the district, if vacancies exist. It might

even help him to obtain employment in some other part of the country. The employment exchange thus controls the payment of benefit. It administers the test which qualifies for benefit. The unemployed workman, when he presents himself at the exchange, may thus be offered either new employment or unemployment benefit.

6. LABOR LEGISLATION IN ONE STATE[43]

That the public has a stake in industrial questions and should shoulder its responsibility was recognized in a substantial manner in Illinois when in 1893 a State Department of Factories and Workshops was created and laws were enacted prohibiting employment of children under fourteen years of age, or of women, in the manufacture of wearing apparel, for more than eight hours a day and forty-eight a week.[44] Previously in 1877 and again in 1891 there had been efforts at child labor legislation, but failure to provide state inspectors to enforce the laws rendered the acts ineffective. Since 1893, the extension of the state control over industry has been almost continuous. Following are some of the more important acts which mark this development:

1897. Child labor law enacted covering not only factories but offices, laundries, mercantile establishments, and stores, and fixing maximum hours of labor of children under sixteen years of age at ten per day and sixty per week.

1897. Act passed requiring the installation of blowers to remove dust from metal polishing, buffing, and grinding wheels.

1901. Child labor law strengthened and all establishments required to provide suitable seats for women and girls.

1903. Present labor law enacted.

1907. Factory Inspection Department established as separate department of the state government and its powers extended.

1907. Present law providing for health, safety, and comfort of workers in factories, mercantile establishments, mills, and workshops enacted.

1907. Act passed to provide for the safety of persons engaged in construction, alteration, or repair of buildings, bridges, viaducts, and other structures.

1908. Act passed preventing employment in coal mines of persons who have not been passed by a State Miners' Examining Board.

[43] Adapted by permission from *Industrial Conditions in Springfield, Illinois*, pp. 141–43. (Russell Sage Foundation, 1916.)

[44] In 1895 the latter provision was held unconstitutional by the state supreme court. In 1910 the same court declared a ten-hour law for women constitutional (*Ritchie & Co.* v. *Wayman and Davies*).

1909. Law enacted fixing hours of work of women in factories and laundries at ten per day.

1910. Act passed providing for fire-fighting equipment in coal mines. Later amended and strengthened.

1911. Women's ten-hour law extended to cover mercantile establishments, hotels, restaurants, offices, and other enumerated places.

1911. Law enacted to protect workers from occupational diseases.

1913. Act passed consolidating and strengthening laws to provide for safety and welfare of workers in coal mines.

1913. Present workmen's compensation law enacted.

Examination of this list shows a fairly rapid extension of the field of labor laws and a gradual strengthening of requirements—but an extension that is not at all unique for an industrial state. Other states have legislated in fields not yet entered in Illinois, as seen, for example, in their establishment of minimum wage boards, the prohibition of night work by women, the limitation of the workday to eight hours for women, the guaranty of one day of rest in seven to all workers, the enactment of compulsory compensation laws, and other measures. That the public will exercise increasing influence through legislation for improved industrial conditions appears certain, and should be encouraged, particularly with reference to the strengthening of the child labor laws, the reduction of the hours

- Individual Bargaining
  - From master and servant to employer and employee
  - Regulation of the work contract in recognition of inequality of bargaining power
- Collective Bargaining
  - The law of conspiracy applied to labor organizations
  - Restrictions on strikes and lockouts
  - Mediation by government
- The Minimum Wage
- Hours of Labor
  - Limitation of daily and weekly hours
  - Limitation of night work
  - Provision of a day of rest
  - Special provisions for women and children
- Safety and Health, including
  - Reporting accidents and disease
  - Prohibition of substances or instruments
  - Exclusion of persons (mainly women and children)
  - Regulation of workshops, mines, transportation
- Social Insurance
  - Industrial accident insurance
  - Health insurance
  - Old age and invalidity insurance
  - Widows' and orphans' insurance (mothers' pensions)
  - Unemployment insurance

TYPES OF LABOR LEGISLATION[45]

[45] Based in part on Commons and Andrews, *Principles of Labor Legislation.*

of working women, the protection of workers from physical hazards, and the establishment of minimum wage boards.

The Worker as Job Seeker
- Regulation of private employment agencies
- Provision of public employment exchanges
- Provision and distribution of public works

The Worker as a Learner
- Provision of vocational training
- School attendance laws
- Continuation school
- Provision of vocational rehabilitation for injured workers

The Worker as Creditor (contributing his services in advance of payment)
- Regulation of time of payment
- Regulation of place of payment
- Regulation of medium of payment
- Regulation of deductions from wages
- Mechanic's liens and wage preference
- Regulation of company stores, houses, and camps

The Worker as Debtor
- Abolition of imprisonment for debt
- Exemption of wages from seizure for debt
- Laws concerning assignment of wages
- Loan shark laws

The Worker as Tenant
- Rent laws

The Worker as Competitor
- Regulation of immigration
- Regulation of convict labor
- Licensing of workmen in some trades (including aviators, electricians, moving-picture operators, stationary engineers)
- Exclusion of women and children

The Worker as a Weaker Individual
- Conciliation courts
- Court of small claims

The Worker in his Job
- Inspection of work places
- Regulation of hours of work
- Regulation of overtime pay
- Compensation for industrial accidents
- Minimum wage

The Worker as Citizen
- Protection of voters against discharge

SOME LAWS WHICH CONCERN THE WORKER[46]

In the succeeding fourteen years the following were the more important acts:

1915. Health and safety laws enacted. Commissions to investigate public pension laws, unemployment and mine conditions.

[46] Based in part on Commons and Andrews, *Principles of Labor Legislation*, chap. ii.

1917. Children's night work law amended. Employment certificate requirements amended. Workmen's compensation extended. Consolidated department of labor created. Commissions to study women in industry and health insurance.

1919. Establishment of free employment offices. Additional mine safety requirements. Workmen's compensation increased. Industrial rehabilitation law enacted.

1921. Public employment offices extended. Child labor laws improved. Workmen's compensation increased. Federal rehabilitation law accepted. Coal mining code revised. Municipal employees pensions created.

1923. Additional mine safety laws. Rehabilitation act amended. Municipal employees retirement law strengthened. Compensation for some occupational diseases.

1925. Workmen's compensation increased. Injunctions in labor disputes forbidden. Mine ventilation laws amended.

1927. Workmen's compensation increased. Mine safety law amended. Public employees' retirement law amended. Appointment of arbitrators authorized.

7. OTHER FORMS OF COMMUNITY CONTROL[47]

The influence of the community is potent in ways other than through legislation. Important, in this connection, is the existence of a public opinion that insists upon the fair and full enforcement of legislation touching industrial matters; that demands intelligent and even treatment of the interests of both employer and employee before the courts and by court officers; that, in other disputed issues where no official tribunal has jurisdiction, will guarantee to both sides equal consideration before claims are decided; that would make it hard for industries and commercial enterprises maintaining conditions below a reasonable standard to do business in the community; and that would work through other channels as occasion demands. Some of these may take form in the establishment and maintenance of agencies to furnish pertinent information on the quality of present law enforcement (through bureaus of government research, committees and commissions on public efficiency, industrial surveys, etc.); in the selection of persons for judicial positions who recognize the importance and complexity of industrial questions and have gone to some pains to make themselves intelligent upon them; in the creation of machinery for arbitration and conciliation of industrial differences; and in the organization and support of quasi-public institutions, such as consumers' leagues, civic improvement societies, and an independent

[47] Adapted by permission from *Industrial Conditions in Springfield, Illinois*, pp. 143–144. (Russell Sage Foundation, 1916.)

press, which afford opportunity in the public interest to thresh out acute industrial situations and to take organized action.

At the same time the community must be willing and expect to bear its share of the legitimate cost of maintaining good industrial standards. There undoubtedly are many cases in which employers are already doing all that they can. In such cases, where the cost of necessary improvements cannot be financed out of the reasonable proceeds of the business, the public, granting that the business satisfies a real need in the community, must be prepared to assume its part of the extra charges, which in most cases would take the form of increased prices. In other words, in addition to giving its preference to establishments meeting good standards as to work conditions, the public should be ready to pay its just share of the costs involved.

8. SOME INTERNATIONAL ASPECTS OF LABOR REGULATION[48]

The World War brought new realization of the dependence of one nation upon another, even in such internal matters as labor regulations. When the Treaty of Versailles was drawn up in 1919 to arrange for peace, the international interests of the worker were recognized in an International Labor Organization in connection with the League of Nations, with headquarters in Geneva, Switzerland.

Annual international labor conferences adopt international standards for labor.—The International Labor Organization works mainly through (1) annual international labor conferences and (2) a permanent international labor office or bureau of international labor statistics. We shall examine these in turn.

In 1919, the first international labor conference was held in Washington, D.C.; the next was held in Genoa, Italy, and since then annual conferences have been held in Geneva. Each member state of the League of Nations may send four delegates; two of these are official government delegates, and the other two are to represent the point of view of employers' organizations and workers' organizations in the country. Fifty-five countries are represented at present.

The main function of the conference is to adopt international agreements on questions relating to labor. These may be of two sorts: (1) *draft conventions* or formal agreements concerning proper labor

[48] Adapted from Wiese and Reticker, *The Modern Worker* (1929). Reprinted by permission of The Macmillan Company, publishers.

standards which are to be ratified by the member states and embodied in their national legislation, and (2) *recommendations,* informal agreements concerning other desirable standards, for the guidance of national governments in drafting national legislation or issuing administrative orders.

During the first ten years of its existence, the International Labor Conference adopted twenty-six conventions and thirty recommendations and submitted them to the member nations. These proposals are concerned mainly with uniform standards in such matters as the following:

CONVENTIONS

1. Limitation of hours of work to eight in the day and forty-eight in the week in public and private industrial undertakings except where only members of the same family are employed.
2. Provision of at least twenty-four consecutive hours of rest in every period of seven days for all employed personnel in public or private industrial undertakings.
3. Minimum age of fourteen for employment of children in industry (twelve in Japan if they have finished the elementary school).
4. Prohibition of employment of women at night, without distinction of age, night defined as at least eleven consecutive hours including the interval between 10 P.M. and 5 A.M.
5. Prohibition of employment of all young persons under eighteen at night, with exceptions for persons sixteen to eighteen under certain conditions.
6. Limitation of night work in bakeries.
7. Prohibition of employment of women for six weeks after child birth with payment out of public funds or by a system of insurance "sufficient for the full and healthy maintenance of the mother and her child."
8. Provision of free public employment exchanges under control of central authority in every member nation and coordination of private employment agencies with the system of public employment exchanges.
9. Workmen's compensation for industrial accidents and for occupational diseases; equality of treatment for national and foreign workers as regards workmen's compensation for accidents.
10. Sickness insurance for all workers in industry and commerce and for domestic servants.
11. Prohibition of the use of white lead in internal painting of buildings.

RECOMMENDATIONS

1. Prohibition of fee-charging employment agencies; establishment of effective systems of unemployment insurance; agreements concerning international recruiting of workers.

2. Weekly rest period of at least twenty-four consecutive hours for all employed personnel in public or private commercial employment.
3. Organization of systems of work place inspection for the protection of workers.
4. Establishment of government health services in each member nation to keep in touch with the International Labor Office.
5. Exclusion of women and children from employment in processes involving danger of lead poisoning.
6. Prohibition of the use of white phospherous in match manufacture in all nations which have not adopted the Berne Convention of 1906.
7. Disinfection of wool suspected of infection with anthrax spores in country exporting or at port of entry in country importing such wool.
8. Minimum scale of workmen's compensation.
9. Provision of special court or board of arbitration for dealing with disputes relating to workmen's compensation.
10. Development of facilities for the utilization of workers' spare time; provision of public baths, swimming pools, garden cities, etc.
11. Reciprocity of treatment of foreign workers.

Other conventions and recommendations are concerned with the welfare of special groups of workers—seamen, agricultural laborers and immigrants.

When draft conventions have been adopted by the Conference, each member is obliged to submit them, within a year, to the "competent authority" in its particular country—in most cases the legislature. The legislature decides whether or not the draft convention shall be ratified by the country. The draft conventions have influence, even in countries which have not yet ratified them. Conventions and recommendations represent ideals which cannot be realized all at once. As ideals backed by international agreement they help to lift standards of labor regulation all over the world.

The International Labor Office is an international bureau of labor statistics.—One of the main functions expressly assigned to the International Labor Office by the Treaty of Versailles is "the collection and distribution of information on all subjects relating to the international adjustment of conditions of industrial life and labor, and particularly the examination of subjects which it is proposed to bring before the Conference with a view to the conclusion of international conventions, and the conduct of such special investigations as may be

ordered by the Conference." Thus the International Labor Office is an international bureau of labor statistics.

The Office maintains a library including, in 1926, 150,000 volumes in thirty different languages and a documents service receiving and circulating 2,000 periodicals from 55 countries. It publishes a monthly *International Labor Review* to provide information on questions it is investigating, an *Official Bulletin*, containing official records of the Organization, and a weekly *Industrial and Labour Information* giving current information on developments of economic and social life in the various countries. In addition to these periodical publications, it issues special volumes of reports on special subjects, the results of special investigations from time to time. All publications of the office are printed simultaneously in English and in French; a considerable number have a German edition also, and one monthly publication appears in Italian and in Spanish. In fact some of the literature of the International Labor Office is produced in eleven or twelve different languages.

An account which is not uncritical of the International Labor Organization[49] calls it "the most vigorous and active section of the machinery of the League of Nations."

D. Securing and Maintaining an Effective Working Force

The events of recent years have brought out into clear relief the fact that it is important to have men work together effectively; that output, abundant, well-balanced output, is of vital interest to society. Notwithstanding this, no fact is more patent today than the ineffectiveness of businesses in this very realm of output. Who is responsible for this ineffectiveness? Part of the responsibility rests upon labor with its feelings of enmity toward capital, its suspicion and fears and distrust, its lack of initiative, its mental laziness, its lack of vision concerning the real issues of the case, its limitation of output, its occasional surrender to poor leadership. So also part of the responsibility rests upon capital and management with their feeling of enmity toward labor, their suspicions and fears and distrusts, their lack of initiative, their mental laziness, their lack of vision concerning the

[49] National Industrial Conference Board, *The Work of the International Labor Organization*, 1928, p. 3.

real issues of the case, their limitation of output, their occasional surrender to poor leadership. As between the two parties, the greater responsibility rests with capital and management, for after all, they hold the directing power. It is their function to make researches into the problem; to plan effective organization; to develop appropriate incentives; to serve society as responsible stewards.

And, unfortunately, part of the responsibility rests with our whole modern organization of society. In our impersonal knitting together of specialists, it is easy for distrust and fear and suspicion to arise; easy for each party to believe that it contributes more to the common weal and receives less return than does the other party; easy for beliefs to solidify into prejudices. We have done little to combat these prejudices. We have done little to instruct the modern specialists concerning their place and duties in society.

Then, too, the organization of our society upon a competitive, gain-spirit basis, valuable in the main, leads to short-sighted policies and to confusion of issues. It is not infrequently true that gains to individuals flow from limitation of output and from other acts harmful to society. It is not infrequently true that short-sighted quest for gain leads to disregard of long-run human values. These seem to be penalties attached to our pecuniary organization of society.

Our survey of the responsibility for inadequate output was undertaken, not to place blame, but to see, in perspective, the task of the personnel manager who realizes that his function is that of aiding in getting men to work together *effectively*. He must understand the causes of inadequate output. He must set himself to the determination of the conditions of good output and then to the realization of those conditions, so far as in him lies.

There are, of course, many possible ways of stating the conditions precedent and prerequisite to good output, and they obviously vary from case to case. Assuming as a type case a manufacturing and selling business, there is submitted the following formulation of these conditions. There should be:

1. Good physical location and good physical plant and equipment, both from the point of view of mechanical processes and from the point of view of their relationship to the workers.

2. Good "human machines" both physically and mentally. This,

of course, includes necessary training, and it applies to management as truly as to workers.

3. Good development of "the will to do" in these human machines —which makes them far more than machines.

4. Good organization and administration, or control, or effective bringing together of persons and the things with which persons work.

5. Good social environment, including in that term, not merely social attitudes and government, but also all economic and social institutions—the church, the school, the place of amusement, the trade union, the banking system, and a legion of others with which the manager must work.

The personnel manager, maintaining always his responsibility for broad social values, must justify his position in the business firm by his contribution to output. The five conditions precedent to good output which have just been mentioned are accordingly matters in which he has a vital concern.

The intensive study of the problem of securing and maintaining an effective working force is little more than a generation old. As business men have worked at the problem they have found occasion to develop certain techniques of employing and placing and training workers, to the end that the right man may be in the right place if possible. Then, too, they have found occasion to make certain that the working conditions of the business plant—its heating, lighting, equipment, hours of work, sanitation, safety, etc.—are such as to secure the most profitable physical and mental response from the workers. This matter of response depends vitally, also, upon the incentives—wage payment, profit-sharing, voice in management, appeal to creative urge, what not—which are utilized.

Personnel problems of a business plant are so difficult to solve, have such an important bearing upon costs, and demand such a specialized technique that many business houses have arranged for a specialized manager to assume charge (subject to the general manager) of this whole task of securing and maintaining an effective working force. Such a manager needs to be broadly conversant with the major activities of the business, and he needs to be a master of the technique of his own operations.

For convenience in treatment, the discussion is arranged in terms

of personnel administration in a modern competitive business. It will be apparent, however, that the same problems exist in a government bureau, in a school system, or in a charitable organization; and it will also be apparent that much the same solutions are appropriate.

In reading the following selections, it will be helpful to keep these issues[49a] in mind:

1. What are the chief activities in which a personnel department may properly engage?
2. What are the chief technical administrative aids (measuring and communicating aids of administration) which are now available for the personnel manager?
3. What generalizations may safely be made with respect to incentives in the modern economic order?
4. In what definite particulars may a personnel department affect the labor costs or the productivity of a plant?
5. In what particulars may a personnel department tend to diminish the fears and insecurities of the worker in a work-contract-wage-system society?

See also "Formula for an Efficient Workman," page 593.

1. SELECTION, PLACEMENT, AND TRAINING[50]

The ability and knowledge to select competently come only after considerable *preliminary work* has been gone through. They involve—

(*a*) Information in advance as to vacancies. Workmen must be educated to give sufficient notice of leaving and foremen must notify the employment department immediately when such notice is given, thus allowing as much time as possible for securing people to fill the positions.

(*b*) A thorough knowledge of what material is available: This includes, in addition to applications on the shelf, a knowledge of con-

[49a] A more detailed statement of issues may be found in *Outlines of the Economic Order*, pp. 136–46. (The University of Chicago Press.)

[50] Taken by permission from N. D. Hubbell, "The Organization and Scope of the Employment Department" in *Bulletin 227* (U.S. Department of Labor, 1917).

ditions of the labor market in the locality, and any strikes, lay-offs, and other conditions affecting it.

(*c*) A close personal contact with foremen: This is part of the missionary work. It is simply getting around the shop as often as time permits and keeping in touch with the foremen regarding their wants and what is available.

(*d*) A general working knowledge of all operations performed: From personal observation and talks with the foremen a general knowledge of the work can be acquired.

THE WORK OF THE EMPLOYING STAFF

EMPLOYING
Bringing the Man and the Job Together

	Securing Workers	Selecting and Placing	
Occupational needs—	Demand for labor	—Interview—	—Application blank
Requisitions —			—References
Job specifications —			—Process chart
			—Organization chart
			—Job specifications
Sources —	Supply of labor	—Testing—	—Physical examination
			—Mental examination
			—Trade examination
Channels —			—Trial at work

(*e*) Standard specifications for all classes of help used: Standard specifications would be an outgrowth of contact with the foreman and would involve a knowledge of the operations and the corresponding kinds of help preferred. These should be reduced to writing and approved by the foreman and employment manager.

(*f*) Knowledge of rates and earnings: It is necessary for the employment manager to have a thorough knowledge of rates paid for all classes of work done. This should include day rates and a general knowledge of average earnings on piecework in the plant and as much of this information as can be gained pertaining to other plants in the locality.

(*g*) Investigation of applicant's record: Proper co-operation on the part of employment managers on the matter of references will en-

able them to weed out many of the undesirables. It is largely a matter of the employment department having sufficient data to give an intelligent and comprehensive record of the man.

(*h*) Physical examination of applicants: Many of the larger and more progressive concerns are now insisting upon a physical examination of new employees before starting work. In many cases it is the outcome of rigid accident compensation laws, but from the purely business standpoint doctors' examinations are a good proposition. They are so common now that very few applicants object to them. A comprehensive employment department is not complete without them.

(*i*) Character analysis: Opinions of employment men vary as to the value of scientific selection and character analysis, but there is without doubt something in the science which would be of value to most employment men. It is for each to use as much of the science as his experience justifies.

(*j*) Testing out applicant for certain work: Many concerns are finding it advantageous in some cases to take the applicant to the department and give him a superficial try-out. This is of special value in the case of operators for special and automatic machines where a minute or two at the machine will prove whether or not the applicant is familiar with it. However, this should be discouraged rather than encouraged.

This will also include taking the applicant into the factory to see working conditions in certain special cases.

Introduce new employees.—At the present time there is not enough attention paid to introducing new employees into the organization properly. If an applicant has been accepted it is worth while to start at once to make him feel at home. The impressions gained during the first few days stay with him and a little personal interest at the start helps him over the critical period. Some one from the employment office should take him to his department when he starts, and the introduction should include:

(*a*) Introduction to foreman and fellow employees: If he is not already acquainted with the foreman he should be introduced to him and arrangements should be made for him to be made acquainted with fellow employees.

(*b*) Explain rules and policies of the company: The most satisfactory way of explaining rules and policies is to give the new man a brief, concise booklet, and supplement it with a verbal emphasis on important points. This gives him an opportunity to study them over at leisure, and not rely on memory to carry all the details.

(*c*) Explain location and use of hospital: The new employee should be shown the location of the factory medical department and

TYPES AND METHODS OF TRAINING

TRAINING
Fitting the man for the job

Workers		Executives	
For the job	In the job	For the job	In the job
—Vestibule school	—Job instructor	—Understudy system	—Group meetings
—Apprentice school	—Foreman	—Flying squadron	—Visits
—Part-time school	—Experienced worker	—Student training	—Associations
		—Special courses	—Literature

It will be noticed that the diagram distinguishes between training that is given before entering upon the job (training *for* the job) and training that is secured after the job is taken (training *in* the job).

impressed with the necessity of going at once to the hospital in case of any injury, no matter how slight.

(*d*) Point out physical surroundings: General layout of buildings, offices, stock and tool rooms, lunchroom, exits, etc., should be pointed out.

(*e*) Point out location of conveniences: This should include wash room, lockers or coat rooms, and toilets to be used in the department to which he is assigned.

Follow up performance of employees.—By taking up this function the employment manager is taking up employment work in the broader sense. This phase of the work is, nevertheless, important,

because by following up the performance of all employees, especially new ones, attention is called to "deadwood," round pegs in square holes, and real live material within the organization. It also acts as a check on the judgment of the man doing the hiring and he should benefit by the experience. This follow up should cover—

(*a*) General conduct.
(*b*) Average earnings.
(*c*) Lateness and accidents.
(*d*) Health and accidents.
(*e*) Efficiency rating or periodic certifications by foreman cover-ering at least—
1. Workmanship.
2. Reliability.
3. Willingness.
4. Attitude.
5. Industry.

2. CONDITIONS OF WORK[51]

[Note: This selection was written from the point of view of action to diminish fatigue. It serves well, however, as a general discussion of conditions of work.]

Introducing recess periods.—One of the common methods of reducing fatigue is by introducing recess or resting periods during a working spell. During such periods, which, in order to be effective, must be obligatory and not discretionary on the part of the workers, they should have an opportunity to rest, relax, move about, and engage in other simple recreation. A little food or a cup of tea or cocoa taken at such a time is often remarkably restorative.

Introducing variety into work.—Much of the modern industrial work consists of a constant and rapid repetition of the same movement. A woman worker in one of our munition factories was recently observed to handle during her day's work 24,000 pieces of a shell fuse and put them through a special process. From seven o'clock in the morning until twelve and from one until six she sat at her machine and fed it with the succession of brass pieces. The occasional introduction of a little variety into her work by training her to some alter-

[51] Taken from Reprint 482, *United States Public Health Service*, pp. 5–11. (Government Printing Office, 1918.)

native process might easily have diminished her fatigue without diminishing the number of finished pieces.

Adjusting the speed.—The capacities of different workers vary greatly. In order to secure uniformity in the work of a squad, where a single motor operates a number of machines, the speed of the motor must be adjusted to the average pace. It may be advantageous to transfer to another job an especially fast or slow person. It is of the utmost importance that each member of the squad should be able to work with the same rhythm and that the speed of operation should be adjusted to this rhythm. The worker's speed, however, depends not merely on the adjustment of mechanical appliances, but is also often increased by a well-planned system of incentives, which may consist of piece rates or bonuses, or the making of the work itself more interesting and attractive.

Omitting unnecessary motions.—The pieces which the worker has to handle should be so placed with reference to height and distance from his hands that he is obliged to make no awkward, unrhythmical, and unnecessary motions or excessive muscular exertions in handling them. His work can thus be done with the least possible waste of energy and time.

Providing adjustable seats.—Where workers are obliged to sit instead of stand at their work, the seats should not be of uniform heights, but should be adjusted to the individual worker, with backs of such shape and position as best to fit and support the worker's back. Where the worker's feet cannot reach the floor, foot rests should be provided.

Ventilation of workrooms.—The ventilation of workrooms is an important aid to efficiency and should conform to the principles of ventilation now accepted. The recent investigation of ventilation has demonstrated that excessive heat and humidity should be avoided so far as possible and that air should be kept in motion.

Sanitary conditions within factories.—As accessory but none the less important means by which fatigue may be lessened and the efficiency of workers increased, there may be mentioned certain general sanitary conditions within factories:

1. Adequate lighting, with the light properly distributed and yet sufficiently concentrated on the work in hand to prevent eye strain.

2. An exhaust system to remove deleterious fumes and dust.

3. Abundant drinking water, cool but not ice cold, within easy reach of the worker.

4. Attractive, quiet rest rooms, especially for women, in which in times of need tired workers may find relief.

5. Lunchrooms or canteens, where a hot lunch of nourishing food, selected according to a scientific dietary and well cooked, may be purchased at cost prices and eaten amid attractive surroundings free from the influence of the saloon.

6. Clean, well-ventilated modern toilets.

7. Washing facilities, with abundant soap and clean towels, and especially shower baths, where the hot, sweaty, begrimed worker may become cool and clean before leaving the plant.

Alternating day and night work.—Man is not naturally a nocturnal animal, and under our present social arrangements night work must always be regarded as inadvisable on physiological grounds. Lack of sleep produces fatigue. The day sleep of night workers is likely to be curtailed, and in the long run night work is likely to be detrimental to health. This is probably more true of women than of men. Where night work is unavoidable, fatigue can to some extent be avoided by allowing the workers to alternate at intervals between day and night, the periods to be not less than one month in duration. Frequent changes of habits may be deleterious to health.

Adjusting hours of work.—A very obvious way to reduce fatigue is by adjusting the number of daily hours of labor. The exact relationship between length of day and quantity of output is not yet fully investigated for all conditions, but the great preponderance of evidence favors a reasonably short working day, even in the interests of the industries themselves.

Avoiding overtime.—Arguments that favor the short working day apply directly to the question of overtime. If the usual day's work is such as just to stop short of undue fatigue, overtime means overwork. It is, of course, sometimes necessary, in order to complete a contract within a required time, to call on the workers to expend the greater effort required. It is, however, a dangerous expedient and a particularly insidious way of diminishing a worker's efficiency.

Omitting Sunday work.—The same principle holds for the duration of weekly labor. It is generally acknowledged by those who have studied the question most carefully that all workers should have one day's rest in seven.

Sanitary conditions outside factories.—Fatigue resulting from the work inside the plant will appear sooner and be a more serious hindrance to output if the worker is not in a sound condition of body and mind when he comes to his task. Anything which an employer can do outside the plant to promote bodily health and vigor and mental contentment is in the long run profitable. It aids in securing a higher class of workers, greater loyalty to the company, a lessened labor turnover, greater skill, and greater general efficiency. Modern housing, attractive home surroundings, opportunities for healthful recreation, club facilities—whatever will keep workers away from the saloons and other places deleterious to health—are all safeguards against industrial fatigue.

See also:
"Formula for an Efficient Workman," page 593.
"Hours of Work," page 623.

3. ACCIDENT PREVENTION[52]

In 1906 the first exhibit of safety appliances in this country was held under the auspices of the New York Institute for Social Service. In 1912 a small group of engineers met in Milwaukee and launched the National Safety Council, which has taken the lead in the war against accidents. In four years' time it included 15,400 representatives from 3,293 firms, covering 4,500,000 workmen.

There are a number of reasons for this remarkable interest. Workmen's compensation laws enacted in most of the States have divided the loss by charging a percentage to the employer. These laws have not only transferred the cost of accidents from employe to employer, but by requiring systematic reporting of accidents have furnished necessary data as to their extent and seriousness. These in turn have led to safety campaigns.

Possibility of preventing accidents.—Experience has shown that

[52] Adapted from Frankel and Fleischer, *The Human Factor in Industry* (1920), pp. 136–40. Reprinted by permission of The Macmillan Company, publishers.

at least 50 per cent of the industrial accidents are preventable. Twenty-two of the foremost industrial concerns of the United States report an average reduction of 54 per cent in yearly accidents after the introduction of organized safety work.

Safety devices.—To accomplish these results many ingenious safety devices have been developed to protect workmen. Glass hoods catch fine steel splinters from the emery wheel; goggles cover the metal grinder's eyes; "congress shoes" with steel plated toes protect the molder from a scalding should he spill the hot metal he is carrying; "safety nets" catch the falling workmen, tools, or materials in construction work; automatically locking doors protect elevator shafts in office building and factory, etc.

Importance of personal equation in the reduction of accidents.—Mechanical appliances play an essential but comparatively small part in accident prevention. The experience of the Illinois Steel Company, one of the pioneer companies in safety work, has led them to evaluate the different methods of attacking the accident problem. Only 17½ per cent of the total reduction in accidents is attributed to the introduction of mechanical appliances, and another 8 per cent to improved lighting and cleanliness. *Education* by means of lectures, or bulletins, or instruction while at work, was held accountable for *30* per cent of the reduction and the organization of *Safety Committees* for *20* per cent. This experience is typical.

Necessity of arousing workers' interest in "Safety First."—If only 25 per cent of all industrial accidents can be traced directly to unguarded or dangerous machinery and equipment it is obviously necessary to stimulate the interest of the employes in "Safety First."

Employees' safety committees.—No method is so successful in arousing the workers' interest and watchfulness as the formation of rotating safety committees. During the first three years of the safety work of the Chicago Northwestern Railway Company, the men who had served on committees reported 6,000 points of danger, and 97 per cent of their suggestions were found practical and adopted.

Safety committee meetings.—The weekly meetings are held on company time at company expense for the discussion of the previous week's accident record, and the study of bulletins and safety litera-

ture. Every sixty days the company gives the committee a smoker and distributes prizes for the best safety suggestions.

It is relatively simple in the initial stages of a safety campaign to arouse the workers' interest. It is more difficult to retain this interest until the individual has formed the "safety habit." To do this, all conceivable means of popularizing "safety first" are needed.

See also:
"The New Strain in Industry," page 560.
"Industrial Accidents and Disease," page 604.

4. INCENTIVE IN MODERN INDUSTRY

It will aid in getting perspective to see the stages through which "incentive and output" have passed in the history of Western industrialism. For convenience in discussion let us speak of three stages: first, *the stage of simple industry,* beginning in the medieval period and extending to the time of the industrial revolution, that is to say, to the latter part of the eighteenth century; second, the *transitional stage,* comprising the first phase of the industrial revolution (roughly a hundred years); and third, the *current stage,* covering the last generation or two of our history which is sometimes called the second phase of the industrial revolution.

Our earlier picture of the stage of simple industry, where two or three apprentices worked for the master craftsman and where an established procedure, drawn on the basis of time spent and achievement, provided for promotion from apprentice to journeyman and from journeyman to master, gives a setting for an appreciation of the application of incentives in that simple society.

It was easy and natural for the worker of that time to develop a pride in workmanship—easy for him to gratify his "creative instinct." He owned and cared for the tools with which he worked and had an owning craftsman's pride in those tools. He owned the product, or at the very least had intimate personal relationships with the owner, and there was accordingly both pride of ownership and a direct visible connection between the amount of output and the amount of reward. He worked through various stages of production in an intimate way so that he saw his work actually developing under his hands and could

feel that he was expressing his personality through his product. The product was typically disposed of to friends and acquaintances so that reputation and standing in the community attached to his workmanship. He saw an almost automatic method of rising to the management of industry so that hope and expectation and realization were closely connected, if indeed they were not one. His position in society was certain and readily understood. And finally custom's firm grip upon his mind kept him free from soul-torturing questionings concerning his status. The picture had its darker side as well. Mental horizons were narrow; mental furniture was meager and bare. The brighter side is here presented not to portray a state to which we could tolerate return, but to give us a comparative basis for the study of present-day incentives.

The transitional period (1750–1880) is marked by an ever-increasing hunger for output, *for output at almost any cost,* and, as always, our industrial structure was adjusted to the situation. It so happened that the deliberate and conscious part of that adjustment was worked out largely on the technological side as contrasted with the personnel side of industry. The reasons for this are easy to see. The results of an improvement in processing were visible and tangible and the manager could measure the gain at once in dollars, whereas attention to personnel meant results far less tangible and measurable. Moreover, the sciences basic to improvement in technology had had considerable development, whereas the social sciences basic to personnel work are of a later time. Again, except for the period culminating in the ephemeral organizations of 1835 and 1836, labor was docile and not inclined to force attention to the terms and conditions attached to its contribution to productivity. It is not surprising therefore that in this transitional period the hunger for output led to the development of schools of technology, such as schools of engineering, mining, agriculture, and to the establishment of the so-called private business colleges concerned with the clerical techniques of administration such as bookkeeping, penmanship and stenography, rather than to the study of intelligent handling of personnel.

But this does not mean that industrial and social forces affecting personnel had been inoperative. Without management being aware of it, tremendous changes had occurred, changes whose consequences

were to be felt most seriously in the later period. In general terms, through default of real attention to the problem, wage had been allowed to become the chief, almost the sole, incentive for the worker. Pride in workmanship and ability to gratify the creative instinct had waned. No longer owning the instruments of work, the worker no longer had a craftsman's pride in them, and shortsighted management provided no substitutes. No longer owning the product, he no longer had a pride of ownership and except for the piece work (and we know how the piece worker fared in rate cutting) the connection between output and reward was not close. Working now mainly in detailed specialized operations and no longer working with simple tools, he could not see the work developing under his hands and could not feel that he was expressing his personality through his product. No longer disposing of his product in a personal way to a local group, his community standing became that of an impersonal factory hand. No longer in a simple society where his status was largely fixed by custom and where he saw without reflection his contribution to social weal, his pride of responsible position was weakened, and neither management nor society saw the wisdom of restoring it. Of all the incentives of the earlier period, wage and wage alone grew in importance, and it is, speaking accurately, a technical device rather than an incentive.

And, unfortunately (unfortunately because the experience gives a false sense of accomplishment and security to many present-day managers) wage, as the prime incentive, seemed to secure satisfactory results. This was only in the seeming. The truth is that the mental attitudes of masses of people changed but slowly under the conditions of that time. The traditions of simple industry still ruled. Men still had pride in work. There still clung to men's minds the individualistic theory of abundant opportunity to rise, a theory nourished by the existence of the frontier and by rapidly expanding industry. Furthermore, although the grip of custom on men's minds had been loosened, its place had been taken by a natural-rights or natural-order philosophy which induced an optimistic outlook upon the workings of competitive industrialism. The transitional period was one of increased output, not because wage was an entirely satisfactory incentive, but because the loss of conditions which provided other incentives had not

been fully realized. Social attitudes had not kept pace with rapidly changing industry.

And now we come to the current phase of the history of output and incentive—the period of the last two generations. Gradually the relationship between productive capacity and the absorbing capacity of the market shifted. Partly because of the great productive gains flowing from improved technology in an industrial régime in which incentive, though greatly changed, had not yet materially weakened; partly because of a checking of the rate of increase of population; partly because the new regions of the world were becoming fairly well exploited, the rate of increase of productive capacity began to outrun the rate of increase of the market. The time is not difficult to locate historically. It was heralded by a series of events. Since markets must be eagerly searched for, the "orthodox" system of distribution —manufacturers to wholesaler to retailer to consumer—which was so satisfactory when the market was seeking the producer, had its hold challenged by devices aimed at enabling the producer to strengthen his grip upon the consumer, and the "commercial revolution," with its mail-order houses, its national advertising, its chain stores, and its direct selling, is now upon us. The trust movement, aimed partly at economies of production but primarily at control of distribution, came into being. The scientific management movement sought lower costs of production through increased and better application of technology to industry, through increased specialization in management, through better location of individual responsibility and through better methods of wage payment (notice the implication that all was not well with the wage incentive). Nations drifted into imperialism and finally into war in the struggle for markets.

In this hurly-burly of changing industrial conditions one thing stands out clearly for our purposes. The tightening of markets did not mean that the producer could reduce his output. On the contrary, because of large-scale production and the presence of enormous overhead costs, he sought means of increasing his output, but it was now imperative that this output should be *at decreased cost.*

The developments in the field of incentives paralleling this new attention to output have been striking. As much as fifty years ago there had clearly emerged, for those who cared to see, a strong suspi-

cion, shared by both workers and management, that all was not well with wage as a sole incentive. Towne and Taylor, who sensed many things ahead of their time, saw the situation. It is no accident that one of Taylor's early contributions concerned itself with methods of wage payment and that he *sought,* at least, a wage which was "psychologically correct." Others in the management group saw it also, but few so clearly. In a bewildered, trial-and-error way they tinkered with other devices—with profit sharing, with welfare work, with this and that miscellaneous practice—and their tinkering was a confession of the inadequacy of the wage incentive acting alone or largely alone. The "will to do" that meant increased output at lowered cost of production was not present among the workers.

And this might have been expected. The spectacular events, for example, the trust movement and the passing of the frontier, which marked the coming in of our current stage of industrialism sank into the minds of the workers as a warning that the day of automatic and easy rise to responsible positions had really passed. There came to them a realization of what the forces of the Industrial Revolution had, unguided, wrought. And they were not minded to acquiesce, for belief in a beneficent "natural order" of things had yielded, thanks to the influence of Darwin, to an evolutionary philosophy which demanded improvement and it yielded the more readily because many happenings had engendered distrust, suspicion, and fear. In default of intelligent action by either management or society, the workers turned naturally and properly to a device of their own with which they had long experimented—the union. That their earlier, and indeed their present, demands were formulated in terms of the gain spirit which seemed to them the characteristic thing in industry, that they sought and still do seek more wages, and more and more, deceives no one who watches other than surface indications. Wage alone will not bring contentment in such an impersonal specialized society as ours. Wage alone cannot bring men to work together effectively. It, unaided, will not remove sourness, suspicion, and hostility. Powerful as it is, valuable as it is when wisely used, it must be linked with forces making for pride of workmanship, interest in work, knowledge of worthwhileness to society, security of economic and social position, and sense of responsibility, before we shall unlock those vast resources of

human energy which now lie dormant because we have not given thought to the fashioning of keys which will free "the will to do."

Let us not deceive ourselves concerning the significance of this "will to do." It involves no mere unthinking performance of "an honest day's work," whatever that may mean. It implies the calling forth of those latent powers which emerge in the joy of doing, and doing understandingly—in the joy of intelligent service. The magnitude of those latent powers we cannot even guess, though hints have been given each of us in our own experiences, and the sense of waste is appalling when we reflect that such powers grow by utilization. Perhaps, both inside and outside the factory, we are not now realizing on one-quarter of the human resources which would be called into being if men worked together understandingly with a real "will to do"—perhaps not one-tenth, perhaps not one-twentieth. Who knows? We merely know that the waste is enormous.

Let us not deceive ourselves, either, concerning the difficulties involved in calling forth this will to do. Generations of sour distrust must be lived down and that cannot happen until the sources of distrust have been removed. Even after the sources of distrust have been removed, there must yet come *understanding,* and this involves both knowledge and appreciation of the place of industry and of specialists in social progress. Not only are the difficulties great, but co-operation in solving them will come grudgingly. The prevailing attitude of hard-headed management is doubtful, if not frankly antagonistic, toward such an enterprise. The prevailing indifference of society at large (witness the lack, in our elementary and secondary-school systems, of studies leading to an understanding of our social relationships) bodes ill for effective co-operation by society. The prevailing attitude of the worker, one of indifference tempered with distrust and hostility, means much cultivation before even seeds can be sown. Nevertheless, the game is worth the candle. Men must be brought to work together effectively, and full effectiveness can come only with the will to do. Administration of incentives must be in terms of that outstanding fact.

See also "The Energies of Men," page 694.

5. WAGES

A. THE PLACE OF WAGES IN INCENTIVES

- Incentives to Efficiency and Loyalty
  - Financial Incentives
    - Wages
    - Bonuses
    - Profit-sharing
    - Promotion
    - Vacation
    - Pensions
    - Group insurance
    - Suggestion awards
  - Non-financial Incentives
    - Pride in company
    - Pride in department
    - Sense of individual achievement
    - Competition
    - Participation in joint activities
    - Improvements of working environment
    - Service activities provided
  - Negative Incentives
    - Discipline
    - Suspension
    - Discharge
    - Demotion
    - Fines

B. TYPES OF WAGES[53]

Inducement of effort is by no means exclusively a problem of *financial* incentives. Man has other mainsprings of action than the desire for pay. The problem of financial incentives is but a single and inseparable aspect of a larger problem and must never be considered as set apart from the general problem of management.

Moreover, financial incentives are not confined to variations in the manner of wage payment. Any measure which increases the effectiveness of pay as a stimulus to productive effort is a financial incentive. Yet, as all such measures must be related to some form of payment, it seems best to classify the subject on the basis of the principal wage forms.

Time payments.—The primary distinction between forms of wages lies between paying for the amount of time worked and paying for the amount of work done. This is equally a distinction between remote and immediate incentives. To pay for the amount of work done is to provide an immediate incentive to do as much work as possible. To pay by the month, week, day or hour is to provide no immediate financial incentive whatsoever. For, if the worker is paid in this

[53] Adapted from E. D. Smith, "Financial Incentives," *Bulletin of the Taylor Society*, XII, No. 3 (June, 1927), 425–30.

way, how hard he works today does not determine how much he will be paid for today's work. Still, how hard he works today, and this week and this year, does affect what job he will hold in the future and how much he will be paid for that job. Time payment is an effective financial incentive in the long run.

With increasing prevalence when time rates are used, all employes doing the same job are paid the same amount regardless of individual merit. One reason such flat payment is growing is because of the increase of interlocking crews where each worker must keep pace with the others in a carefully timed sequence of operation. In such locksteps the worker must produce neither more nor less than the standard amount. There is alike no chance to lag and none to spurt. The only incentive to effort desired is an incentive to keep in line—and this is provided by the flat rate backed by the power of discharge.

Because of the leveling effect of the flat time rate, where individual effort and attainment is desirable and where bargaining conditions do not interfere, *graduated time rates* are extensively used. Often this graduation has been accomplished by combining flat rates for each job with lines of promotion from job to job. Under such a system, while the bargaining advantages of flat rates are retained, there is a substantial financial inducement to do better than the average on the present job in order to be promoted to the higher pay and prestige of the next. A more effective form of financial incentive is brought about when there is also *graduated pay for the individual job* and the amount the workman receives depends upon production, quality, waste or other merits that it is desired to stimulate.

Probably the most important steps in improving time payment as a financial incentive have thus been the clearer definition of the reasons for advancement, and the regularization of pay changes by employment department supervision and by accurate records of the employe's attainment. Production records have for years been widely employed, but recently the technique of rating has developed sufficiently so that ratings of other merits, such as quality, versatility or waste, have become important means of determining an employe's pay value.

The importance of records and of making the employe aware of his standing and progress removes much of the significance of the dis-

tinction between financial and the so-called "non-financial" incentives. Rarely does either stand entirely alone.

Payment for work done.—An immediate financial incentive is provided when the amount which the employe receives each pay day depends directly upon the amount of work he has done. Before the advent of scientific management direct payment for results almost universally took the form of *straight piece rates.* The old piece rates were set either by the hunch of the shop foreman or by a bargain between the union and the company. They were consequently crude and not fairly adjusted to the amount of skill and effort required to make the particular product. The greatest defect in the old piece rate, however, was that the practice of rate cutting was commonly associated with it.

With the coming of scientific management the same forces that contributed so richly to the improvement of manual technique were applied to the improvement of wage technique and the restoring of the vitality of direct financial incentives. Conditions and methods were carefully studied and standardized, not merely to make them as efficient as possible, but also to make them as stable as possible. The amount of output which an employe could give using standard methods under standard conditions was then determined as accurately as possible by time study. This *scientifically determined piece rate* was expected to stand the test of time and was promulgated with the guarantee that it would not be cut unless the method of manufacture was substantially changed. This rendering of the piece rate at once accurate and secure against cutting cured most of its former evils.

This primary development ushered in a host of lesser improvements and modifications. Variety began to appear in the manner in which the financial pressure was applied. The straight piece rate gave a fixed return per piece and varied neither to mitigate the hardship of the learner nor to stimulate the attainment of a set standard. The newer rates varied in a number of ways for a number of purposes.

An important advance in the technique of payment for work done is the statement of output in terms of standard time, instead of in terms of number of products or operations finished. Each job is given a definite standard number of minutes for its performance, and the employe paid so much per standard hour regardless of the actual time

taken. The financial result to the employe is exactly the same as if the work was paid for by the piece, but the whole problem of calculating production is greatly simplified by having all jobs stated in terms of a common unit.

The most recent development of piece rates is the *group rate.* Its essential principle is the teaming of the employes engaged in making a common product into groups and the payment of each individual in the group in direct proportion to the group output. The group piece rate combines a social incentive with the direct financial incentive. Each employe works not for himself alone, but for his group as well. Upon him, if he lags, falls not only individual loss, but social disapprobation. In those groups where individual variation is not possible, the straight group piece rate, while being as well adapted to lock-step conformity as the flat time rate, provides an effective incentive to the members of the group, while keeping step, to quicken their pace. In those groups where individual attainment is desirable, it is customary to combine the group piece rate with graduated individual time rates, thus making it possible to recognize whatever individual qualities it is desired to stimulate. Moreover, different individuals within a group may be given different shares in the group total, based on the relative difficulty of their allotted tasks or their individual merit. Individual production records may even be kept and used as a basis on which to adjust from month to month, or quarter to quarter, the ratio that the individual receives out of the common earnings. Thus, in one way or another the group rate may be combined with recognition of the individual, and if this is skilfully done, the various individual incentives are united with an immediate social one, with little loss to either.

The greatest merit of the group rate is not the addition of social to individual financial pressure as a spur to individual effort. It is the transfer of employe interest and attention from individual attainment to co-operative output.

Some general principles.—While no form of financial incentive can be unqualifiedly endorsed or condemned, certain principles apply to the problem generally.

1. The effectiveness of any form of financial incentive depends largely upon the degree of reliability with which the reward varies in proportion to the value rendered.

2. The introduction of precise direct-reward incentives must follow, not precede precise managerial control.

3. In introducing financial incentives one should always count the cost.

4. In considering the effect of any financial incentive, its effect on the whole problem of production, not just upon output, must be considered.

5. When all is said and done, much of the best value of an employe is too intangible for reward and, therefore, for stimulation by any form of financial incentive, even the time rate.

C. A WAGE FORMULA[54]

[This is an interesting attempt to fix wage rates in terms of all factors bearing upon the economic good of the plant. The particular equation shown was one which is regarded as applicable when the premium method of payment was used. Do not try to master the details; merely notice the range of factors which are taken into account and compare such a method with the ordinary time or piece rate system.]

The equation is

$$r = \left[\left(\frac{K[B(1+i+m+ny)+R](1+2e)}{V(1+1.3E-3.e)(1+.35P_a)+S} \right) (P_t+P_d(1+.5e)) \right] C$$

and for the determination of labor and indirect cost (not including materials) is:

$$X = [r\ (1+e)\ + R]\ t$$

The definitions of terms follow. They are common in both equations:

r = Base hourly rate man is to receive

K = A constant, when V is 100 per cent, to bring worker under standard conditions to standard rate

B = Fundamental base rate, temporarily that of 1905

i = Percentage of increase in living since 1905, taken on the 15th of January, April, July, and October

m = Percentage allowed for each extra process known or learned

n = Percentage allowed for years of connected service

[54] Adapted by permission from G. D. Babcock, "The Taylor System in the Franklin Shops," *Industrial Management*, LII (1917), 534–54.

y = Years of such service
R = Fixed charges rate per hour which man has chance to modify
e = Percentage of premium earned on time allowance
V = 100, which is the standard accomplishment per cent
E = Standard premium task time set
P_a = Percentage of time absent or late
S = Value of spoiled work per producing hours worked
P_t = Percentage of time under task
P_d = Percentage of time spent on non-task or straight time work
C = Co-operation and conduct
X = Labor and fixed charge cost
t = Time taken to do work

6. PROFIT SHARING AND RELATED DEVICES[55]

Broadly speaking, the profit-sharing principle divides itself into five major groups:

1. *Profit sharing* in the real sense of the word, with these essential features:
   a) Amount to be distributed varies with and depends upon the net profits of the concern or upon the amount of dividends paid the stockholders.
   b) Proportion of profits for distribution is definitely determined in advance.
   c) Benefits of plan extended to at least one-third of the total employed, and including employees in occupations other than executive or clerical.
   d) Method of determining individual shares is known, at least in a general way, to the participating employees.
2. *Limited profit sharing,* with these essential features:
   a) Same as (*a*) in profit-sharing plan above.
   b) Same as (*b*) in profit-sharing plan above.
   c) Benefits of the plan limited to less than one-third of the total employed, and excluding employees other than executive or clerical.
3. *Bonus plans,* under which the divisible fund does not depend upon or vary with the net profits of the enterprise, but upon any one of the following factors:

[55] Taken from *Bulletin 208, U.S. Bureau of Labor Statistics,* and Mallory, Mitchell, and Faust, *Profit Sharing as an Aid to Contented, Efficient Labor.*

a) Price for which commodity manufactured is disposed of—the so-called sliding-scale wage.

b) Gross receipts or gross profits—a variant of the sliding scale.

c) Estimated probable profits on business.

d) Wages or salaries earned and length of service.

e) Length of service and thrift, as shown by the participant's ownership of stock of the employing company or maintenance of a savings account.

f) Savings of the prospective participants as shown by subscription or ownership of a specified amount of stock of the employing company, or savings accounts.

g) Amount of savings collectively effected in production or operation.

4. *Benefit associations* which are affected by the following factors in distributing their funds:

a) Where the industry concerned contributes materially toward the maintenance of such fund.

b) Where the industry concerned makes a merely nominal contribution toward this fund.

c) Necessities in each individual case.

d) Length of service or period of membership in association.

5. *Pension funds,* with these determining factors:

a) The fund maintained wholly by the company itself.

b) Contributions or assessments made on the employees by the company for aid in maintaining this fund.

c) Amount allowed each year by the company definitely determined upon in advance.

d) Amount set aside to be a percentage of the annual pay-roll.

e) Method of arriving at amounts of pensions awarded each person is governed by:

(1) Length of service.

(2) Wages earned.

(3) Individual necessity.

7. THE MEANING AND PLACE OF EMPLOYEE REPRESENTATION[56]

Employee representation defined.—The term "employee representation" is commonly used to refer to arrangements by which the employees of a company are represented by elected delegates on committees or councils which have some concern with the affairs of the

Employees' Needs	Employers' Needs
A channel for obtaining knowledge of pertinent facts concerning the business, the "why" of the employer's policies and acts.	A channel for obtaining an understanding of the employees' desires and attitudes.
A means of knowing in advance proposed changes and reasons therefor.	A means of determining group reaction to proposed changes.
An orderly means of presenting complaints and grievances apart from the foreman who may be a party to the grievance.	A means of prompt settlement of incipient grievances and the prevention of disputes.
A means of making suggestions to the management, expressing the employee's opinions and desires.	A means of educating workers in the problems of the business and of educating foremen to consider the worker's point of view.
An opportunity for expression of personality through more constructive participation in industrial processes than is afforded by routine mechanical tasks.	An incentive by which to enlist the employees' good will and co-operation in increased production and elimination of waste.

NEEDS TO BE MET BY EMPLOYEE REPRESENTATION

business. Employee association, industrial assembly, shop committee, works committee, works council and company brotherhood are among the names given to such plans. Whatever term may be used it has come to mean generally an organization which has been initiated and fostered by the employer, the membership being confined to the employees of one company, and usually of one establishment. Some writ-

[56] Adapted from Wiese and Reticker, *The Modern Worker* (1929). Reprinted by permission of The Macmillan Company, publishers.

ers have referred to such organizations as "company unions," thus distinguishing them from labor unions which have membership in different companies and are initiated by workers themselves. This discussion will use the term "works council" as more accurately describing the usual development of employee representation.

The works council is expected to serve the needs of both employer and employee.—It has become clear that even when a company has provided an effective personnel department and has trained its foremen and other executives to take a personnel point of view in dealing with workers it has not met all the personnel needs of the company or the workers. Increasingly the employer has come to realize that he needs constitutional government in his establishment. He needs it for himself, for his business is so large that he cannot maintain the informal contacts with his workers which give him an opportunity to know what's on the worker's mind. He needs it for his management group to restrict the possible autocracy of petty bosses. He needs it for his workers to enlist their interest, loyalty and cooperative effort. At the same time, the workers may wish for participation in the plans and arrangements which apply to them. Employee representation is thought of by many as a sort of constitutional government in industry.

[Note: A further discussion of employee representation occurs in the chapter on Co-ordination through the Market for Labor in Part III.]

8. ORGANIZATION AND FUNCTIONS OF THE PERSONNEL DEPARTMENT[57]

[On the following page is a "functional" organization chart of a personnel department appropriate for a business of considerable size. It will serve well as a review of the subject matter of this entire section on Securing and Maintaining an Effective Working Force, and it will also serve to show the relationships of the personnel department to the other parts of the business organization.]

[57] Adapted from Gordon S. Watkins, *Labor Management*, p. 128. (A. W. Shaw Co., 1928.)

Personnel Director

Plant Advisory Committee—Department Heads

Personnel Council to Coordinate Functions of Personnel Department Heads of Divisions

Employment Division

Personnel

Employment Manager
Interviewers
Clerical Assistants

Functions

1. Make contacts with sources of labor supply
2. Interviewing
3. Selection and placement
4. Introduction of new employees
5. Follow-up of all employees
6. Instruction as to company rules and policies
7. Control of transfers and promotions
8. Control of tardiness and absenteeism
9. Control of labor turnover
10. Compilation of individual records
11. Regular and special reports

Health, Safety and Sanitation Division

Personnel

Physician
Safety Engineer
Sanitary Engineer
Dentist
Nurses
Specialists
Clerical Assistants

Functions

I. MEDICAL SERVICE

1. Physical examinations
2. First aid
3. Follow-up in accident cases
4. Diagnosis in cases of ordinary illness and occupational diseases
5. Rest-room supervision
6. Promotion of personal hygiene
7. Epidemic prevention
8. Prevention of fatigue
9. Visiting nurse and home service
10. Research and health reports

II. DENTAL SERVICE

1. Entrance and follow-up examinations
2. Emergency treatment
3. Diagnosis of serious cases
4. Recommendations to outside dentists
5. Promotion of dental hygiene
6. Reports and suggestions

III. SANITATION SERVICE

1. Supervision of plant and grounds
2. Community inspection and clean-up
3. Water analysis and supply
4. Inspection and control of locker rooms, wash-rooms, lavatories
5. Control of janitor and matron service
6. Reports and recommendations

IV. SAFETY SERVICE

(Details omitted)

Education, Training and Research Division

Personnel

Director
Instructors
Research Assistant
Clerical Assistants

Functions

I. EDUCATION AND TRAINING SERVICE

1. Job instruction
2. Special technical courses
3. Apprenticeship training
4. Americanization and general elementary courses
5. Special training for transfer, promotion and inspection
6. Cooperation with public continuation schools and night schools
7. Cooperation with private technical schools
8. Foremanship training
9. Courses for special instructors
10. General and technical courses for executives
11. Lecture service
12. Library service
13. Plant publications
14. Cooperation in all matters of education and publicity
15. Administration of mental, trade and special abilities tests

II. RESEARCH SERVICE

1. Job analysis
2. Time and motion studies
3. Investigation of wage systems
4. Formulation of special incentive plans
5. Occupational classification
6. Labor analysis and plant analysis
7. Analysis of trends in cost of living and wage rates
8. Studies in current labor movements and labor legislation
9. Investigation of personnel programs of other companies
10. Cooperation in accident and sickness analysis
11. Statistical service to other divisions
12. Reports, surveys, suggestions

Welfare Service Division

Personnel

Supervisor
Assistant Supervisors
Clerical Assistants

Functions

1. Supervision of loans to employees
2. Administration of savings fund
3. Supervision of sickness benefit, pension and insurance funds
4. Cooperation in rest-room supervision
5. Investigation and control of housing facilities
6. Organization and direction of athletic programs
7. Organization and direction of social and recreational activities
8. Legal aid and advice
9. Financial aid and advice
10. General personal counsel
11. Supervision of employees' gardens
12. Administration of vacation plans and facilities
13. Direction of relief committees
14. Supervision of lunchroom and cafeteria service
15. Supervision of cooperative buying
16. Cooperation with civic agencies in matters touching recreational and welfare activities
17. Reports and recommendations

Joint Representations Division

Personnel

Manager
Secretary
Clerical Assistants

Functions

1. Hearing complaints
2. Adjustment of grievances
3. Regulation of employment conditions
4. Promotion of plant efficiency
5. Control of plant discipline
6. Cooperation in administration of benefit services
7. Assistance in the formulation of shop rules
8. Direction of shop committees and work councils
9. Medium of communication between unions and the company
10. Cooperation in control of living conditions
11. Cooperation in educational, publicity, and public relations activities
12. Reports and suggestions

E. The Conservation of Human Energy

When we examined that part of our social energy which the economist usually calls "natural resources" we saw that the problem of conservation—wise utilization—is a pressing one. From one point of view, even more important and pressing is the problem of the conservation of human energy, for human beings are both a significant part of our productive resources and, in some real sense, the end or goal of our productive activities. From another point of view, effective utilization of human energy is not as pressing a problem as the one connected with natural resources, because human energy in the form of a "labor force" is to a considerable extent reproducible, not physically limited by nature.

Incredible as it sounds, there are today great wastes of our human resources. Some of these wastes are due to ignorance; others are due to certain features of our social organization. We shall wish, not only to examine the main forms of current wastes, but also to see what is being done by way of remedial action. Part of this territory has already been covered in the preceding sections on the position of the worker in the modern economic order. In this present section we shall consider the matter from a somewhat broader point of view, in that the present section will not be confined to a discussion of that part of our population which works for hire.

These issues[57a] may appropriately be kept in mind while reading the following selections:

1. What ones of the chief forms of human waste today are peculiar to our organization of society and what ones would exist in any other organization of society?
2. What are the most promising methods of diminishing human waste in our society?
3. What are the chief methods which have been advanced for improving the quality of the population?
4. What are the chief arguments which have been advanced against man's attempting to control the quality of the population.

[57a] A more detailed statement of issues may be found in *Outlines of the Economic Order*, pp. 146–49. (The University of Chicago Press.)

1. A CATALOGUE OF HUMAN WASTES[58]

- Men who go to waste
  - The idle
    - Involuntarily
      - The sick and injured
      - The unemployed
    - Voluntarily—The leisure class
  - The ineffectively occupied
    - Because of lack of training
    - Because of lack of opportunity
    - Because of lack of personal initiative and incentive
    - Because of weakened physical and mental power
    - Because of poor organization and direction of effort
  - The harmfully occupied
    - Wasting their own energy
      - In vice
      - In dissipation
    - Wasting the energy of other people
      - By crime
      - By fraud
      - By luxury
      - By false teaching
      - By bad direction of social energy

2. A PROGRAM FOR LONGER AND BROADER LIFE[59]

There is no doubt that it is possible to prolong life. Making every allowance for inadequacies of statistics, we have strong reason to believe that life is twice as long as three or four centuries ago, and modern records show that it is today increasing more rapidly than ever. The rate at which this lengthening proceeds per century is shown in the following table:

RATE OF LENGTHENING LIFE (IN YEARS, PER CENTURY)

Country	Periods	Males	Females
England	1838–54 to 1871–81, or 30 years	5	9
England	1871–81 to 1891–1900, or 20 years	14	16
France	1817–31 to 1898–1903, or 76 years	10	11
Prussia	1867–77 to 1891–1900, or 23 years	25	29
Denmark	1835–44 to 1895–1900, or 57 years	13	15
Sweden	1816–40 to 1891–1900, or 67 years	17	15
United States:			
Massachusetts	1789 to 1855, or 66 years	7	
Massachusetts	1855 to 1893–97, or 40 years	14	
India	1881 to 1901, or 20 years	0	

From this table we observe:

First. That the rate of progress is extremely variable in different

[58] Adapted by permission from Carver, *Principles of Political Economy* (Ginn & Co.).

[59] Adapted from Irving Fisher's report on "National Vitality, Its Wastes and Conservation," in the *Report of the National Conservation Commission* (1909), III, 724–31, 655–69, 739–42, 748–51.

countries. The average rate of improvement for all countries, excepting India, is about fifteen years per century.

Second. It is noticeable that in practically all cases the improvement is more among females than males. This is one expression of the progress which womankind is now making in all lands.

Third. This table, as well as the estimate of Professor Finkelnburg, shows that not only is the average duration of human life increasing, but that the rate of increase is also increasing.

We may briefly summarize chronologically the general rate of increase as follows:

LENGTHENING OF HUMAN LIFE PER CENTURY

During seventeenth and eighteenth centuries	4
During first three quarters of the nineteenth century	9
Present rate in Massachusetts	14
Present rate in Europe	17
Present rate in Prussia	27

It would be surprising if the future should not witness a further lengthening of human life, and at an increasing rate. Of course there is a limit to the further increase of human life, but there is good reason to believe that the limit is still far off.

It has been estimated that it is possible to prolong life fifteen years.[60] This is equivalent to reducing the death-rate by about one-fourth. This estimate is but a minimum.

Length of life is but one indication of vitality. Everyone recognizes that the life of a valetudinarian or an invalid, however long, is but a narrow stream. We may therefore conceive, besides the dimension of length, another dimension of life, which may be called its "breadth." By the breadth of life we mean its healthiness. An ideally healthy life, free throughout from ailment and disability, is rarely, if ever, found. But it is the aim of hygiene to approximate such an ideal.

In order that American vitality may reach its maximum development, many things need to be done. Among them are the following:

1. The national government, the states, and the municipalities should steadfastly devote their energies and resources to the protec-

[60] The extensive statistical study upon which this estimate is based is omitted.—EDITOR.

tion of the people from disease. Such protection is quite as properly a governmental function as is protection from foreign invasion, from criminals, or from fire. It is both bad policy and bad economy to leave this work mainly to the weak and spasmodic efforts of charity, or to the philanthropy of physicians.

2. The national government should exercise at least three public-health functions: first, investigation; second, the dissemination of information; third, administration.

It should remove the reproach that more pains are now taken to protect the health of farm cattle than of human beings. It should provide more and greater laboratories for research in preventive medicine and public hygiene. Provision should also be made for better and more universal vital statistics, without which it is impossible to know the exact conditions in an epidemic, or, in general, the sanitary or insanitary conditions in any part of the country. It should aim, as should state and municipal legislation, to procure adequate registration of births, statistics of which are at present lacking throughout the United States.

The national government should prevent transportation of disease from state to state in the same way as it now provides for foreign quarantine and the protection of the nation from the importation of disease by foreign immigrants. It should provide for the protection of the passenger in interstate railway travel from infection by his fellow-passengers and from insanitary conditions in sleeping-cars, etc.

It should enact suitable legislation providing against pollution of interstate streams.

It should provide for the dissemination of information in regard to the prevention of tuberculosis and other diseases, the dangers of impure air, impure foods, impure milk, imperfect sanitation, ventilation, etc. Just as now the Department of Agriculture supplies specific information to the farmer in respect to raising crops or live stock, so should one of the departments, devoted principally to health and education, be able to provide every health officer, school teacher, employer, physician, and private family with specific information in regard to public, domestic, and personal hygiene.

It should provide for making the national capital into a model sanitary city, free from insanitary tenements and workshops, air pol-

lution, water pollution, food pollution, etc., with a rate of death and a rate of illness among infants and among the population generally so low and so free from epidemics of typhoid or other diseases as will arouse the attention of the entire country and the world.

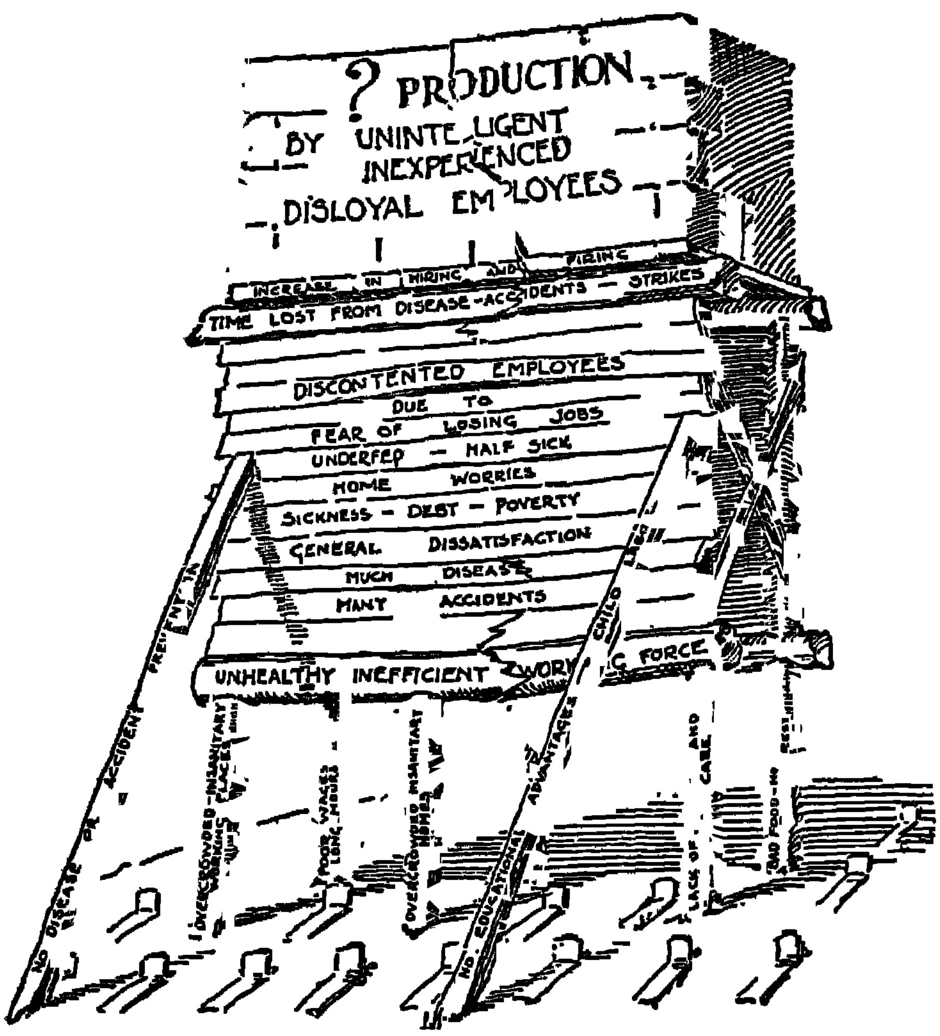
There should be a constant adaptation of the pure-food laws to changing conditions. Meat inspection, and other inspection, should be so arranged as to protect, not only foreigners, but our own citizens. The existing health agencies of the government should be concentrated in one department, better co-ordinated, and given more powers and appropriations.

3. State boards of health and state legislation should provide for the regulation of labor of women, should make physiological conditions for women's work, and prevent their employment before and after childbirth; should regulate the age at which children shall be employed, make reasonable regulations in regard to hours of labor and against the dangers in hazardous trades, and especially against the particular dangers of dust and poisonous chemicals; should make regulations for sanitation and provide inspection of factories, schools, asylums, prisons, and other public institutions. Where municipalities have not the power to enact the legislation above mentioned with reference to local conditions, the necessary legislation or authority should be provided by the state. Or where, by reason of the small size of the town, no sufficient local action is possible, the state should exercise the necessary function. It should, in such cases, advise and supervise local boards of health. It should have an engineering department and advise regarding the construction of sewers and water supplies. Pollution of such supplies, unless entirely local, should be prevented by the state, which should be equipped with laboratories for the analysis of water, milk, and other foods. Suitable legislation should be passed regulating the sale of drugs, especially preparations containing cocaine, opium, or alcohol. Legislation—not too far in advance of public sentiment needed to enforce it—should be passed regulating the sale of alcoholic beverages. State registration of births, deaths, and cases of illness should be much more general and efficient than at present.

4. Municipal boards of health need to have more powers and greater appropriations; less political interference and better trained

health officers; more support in public opinion. Their ordinances in regard to expectoration, notification of infectious disease, etc., should be better enforced by the police departments.

More legislation should be advocated, passed, and enforced to the end that streets may be kept clean, garbage properly removed, sewage properly disposed of, air pollution of all kinds prevented, whether by smoke, street dust, noxious gases, or any other source. Noises also should be lessened.



Courtesy of Mock, *Industrial Medicine and Surgery* (W. B. Saunders Co.)

HUMAN WASTE

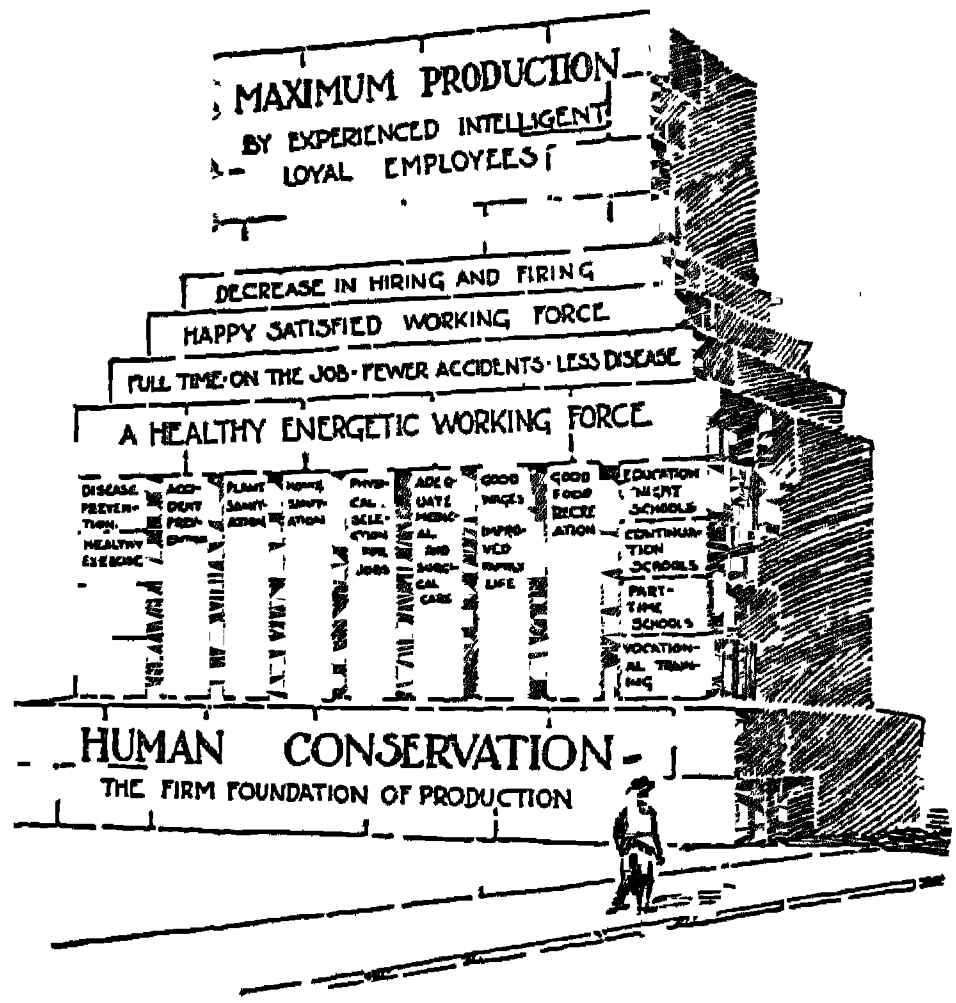
AN INSECURE FOUNDATION OF PRODUCTION

Municipalities need also to take measures to prevent infection being carried by flies, mosquitoes, other insects and vermin, and by prostitution. They need to guard with greater care the water supply, and in many cases to filter it; they should make standards for milk purity and enforce them; they should also regularly inspect other foods exposed for sale; provide for sanitary inspection of local slaughter houses, dairies, shops, lodging and boarding-houses, and other establishments within the power of the particular municipality; they should make and enforce stricter building laws, especially as relating to tenements, to the end that dark-room tenements may be eliminated and all tenements be provided with certain minimum standard requirements as to light, air, and sanitary arrangements.

5. School children should be medically inspected and school hygiene universally practiced. This involves better protection against school epidemics, better ventilation, light, and cleanliness of the schoolroom, the discovery and correction of adenoids, eye strain, and nervous strain generally, and the provision for playgrounds. Sound

scientific hygiene should be taught in all schools, public, private, normal, and technical, as also in colleges and universities.

6. The curricula of medical schools should be rearranged with a greater emphasis on prevention and on the training of health officers. Sanatoria and hospitals, dispensaries, district nursing, tuberculosis classes, and other semi-public institutions should be increased in number and improved in quality. The medical profession, keeping pace with these changes, should be the chief means of conveying their benefits to the public. Universities and research institutions need to take up the study of hygiene in all its branches. Now that the diseases of childhood are receiving attention, the next step should be to study the diseases of middle life. These are diseases, to a large extent, of nutrition and circulation, and consequently these subjects should receive special attention. Intelligent action must rest on knowledge, and knowledge of preventing diseases is as yet extremely imperfect.



Courtesy of Mock, *Industrial Medicine and Surgery* (W. B. Saunders Co.)

HUMAN CONSERVATION

A SECURE FOUNDATION OF PRODUCTION

7. In industrial and commercial establishments employers may greatly aid the health movement, and in many cases make their philanthropy self-supporting by providing social secretaries, lunch and rest rooms, physiological (generally shorter) hours of work, provision for innocent amusements, seats for women, etc.

Life insurance companies could properly and with much profit club together to instruct their risks in self-care and secure general legislation and enforcement of legislation in behalf of public health.

8. The present striking change in personal habits of living should

be carried out to its logical conclusion until the health ideals and the ideals of athletic training shall become universal. This change involves a quiet revolution in habits of living, a more intelligent utilization of one's environment, especially in regard to the condition of the air in our houses, the character of the clothes we wear, of the site and architecture of the dwelling with respect to sunlight, soil, ventilation, and sanitation, the character of food, its cooking, the use of alcohol, tobacco, and drugs, and last, but not least, sex hygiene in all its bearings.

9. The fight against disease will aid in the fight against pauperism and crime. It is also true that any measures which tend to eliminate poverty, vice, and crime will tend to improve sanitary conditions.

10. Finally, eugenics, or hygiene for future generations, should be studied and gradually put in practice. This involves the prohibition of flagrant cases of marriages of the unfit, such as syphilitics, the insane, feeble-minded, epileptics, paupers, or criminals, etc. The example of Indiana in this regard should be considered and followed by other states, as also in regard to the unsexing of rapists, criminals, idiots, and degenerates generally. A public opinion should be aroused which will not only encourage healthy and discountenance degenerate marriages, but will become so imbedded in the minds of the rising generation as will unconsciously, but powerfully, affect their marriage choices.

3. A MODERN HEALTH PROGRAM[61]

Modern preventive medicine has passed through two stages and has entered upon a third. At first, disease was seen chiefly in the environment. Stress was laid upon the "filth" theory. Effort was directed to sanitation, to improve water supplies, to sewage and refuse disposal and to abatement of nuisances. In the second stage, attention was centered upon infectious diseases. Bacteria in individuals were recognized as a menace. Inspection, compulsory reporting of contagious disease, and quarantine were resorted to. The third stage recognizes the importance of personal hygiene. A large majority of the diseases which contribute to the death-rate cannot be controlled by

[61] Adapted from G. E. Vincent, "Public Welfare and Public Health," *Annals 105–107 of the American Academy of Political and Social Science*, CV (January, 1923), 36–41. (Philadelphia.)

public authorities. These maladies can be avoided or minimized only by the intelligent self-control of the individual. Hence the demand for education in public health, the agitation for periodic medical examinations of all citizens, the call of physicians who will be counselors for health rather than curers of disease.

The progress of modern preventive medicine has revealed a gradual changing of ideals and shifting of emphasis. Health in the individual and the community will less and less be thought of as absence of weakness and pain, more and more as a sense of vigorous well-being and abounding energy. However, public health progress is conditioned by the state of scientific knowledge. The achievements of the last half century are directly traceable to significant discoveries, especially in the field of bacteriology.

The practical application of this scientific knowledge has been successful in many countries. Striking examples of sanitary statesmanship are the campaigns against malaria and yellow fever by Ross in India, Grassi, Bignami and Bastianelli in Italy, Finlay and Gorgas in Cuba and Gorgas in Panama. The less conspicuous activities of cities, states and nations in protecting community health have in the aggregate produced momentous results. Death-rates in the leading countries of the world have been lowered during the last twenty years in a dramatic way. In the registration area of the United States the decline in the general death-rate since 1900 has been from 17.6 to 11.7.

The protection and fostering of health are primarily governmental tasks. Only the city, the county, the state or the nation can exercise the police power and levy the taxes which are essential to successful, efficient administration of health work. Voluntary agencies may support but they cannot replace public authority. Moreover, the international nature of public health calls for the cooperation of governments, which are more and more working together in a common effort to control epidemics, regulate quarantine, standardize biological products and health procedures and thus gradually create a world health organization.

While governments must assume primary responsibility for preventive medicine, private voluntary agencies play an important part in the modern movement for fostering health. In the United States alone

there are more than sixty private associations and societies which seek to promote various phases of public health work. The National Red Cross and the International Red Cross with its headquarters at Geneva are giving much attention to health campaigns. Life insurance companies and endowed foundations are also devoting large sums to similar purposes. Demonstrations in the control of a given disease or in the carrying out of a general health program may be conducted under the joint auspices of a public health department and of a voluntary health society. The education of the public is one of the most useful of the services which private agencies can render. Not only are better hygienic habits encouraged among the people, but public opinion is organized in support of government authorities in carrying out their programs.

A comprehensive modern public health program should, according to Rosenau, embrace the following useful fields of activity: (1) the prevention of the communicable diseases, (2) the prevention of the non-communicable diseases, (3) sanitation, or biologic cleanliness, including an improved environment, (4) vital statistics, or the bookkeeping of humanity, (5) education, or the diffusion of knowledge among the people in regard to sanitation and hygiene, (6) infant welfare and the reduction of infant mortality, (7) the health and development (physical, mental and moral) of the school child and the adolescent, (8) food and nutrition, the relation of diet to growth and health, (9) industrial hygiene, the health of the worker, (10) personal hygiene, mental hygiene, (11) maternity and the care, protection and encouragement of the function of motherhood, (12) eugenics, the principles of sound breeding and heredity, (13) research to extend the boundaries of knowledge.

The social and economic implications of public health ought not to be overlooked. Public health depends not only upon sanitation and the control of contagious diseases, but on nutrition, housing, recreation, mental content and serenity. In this large sense public health becomes a question of the standard of living, of economic production and the distribution of wealth. In short, it raises the whole social problem. It is intimately related to the entire field of public welfare. In this wider meaning it calls for more than the governmental activity of a health department. It demands the cooperation of all welfare

agencies, each one of which can make a contribution to public health considered in its social relations.

4. POSSIBLE SAVINGS FROM HEALTH SUPERVISION[61a]

It should be remembered that these formulae are derived from actual experience in carefully studied groups and are not based upon mere estimates by authorities. They agree, however, in many particulars with the expert opinion grouped in the *Report on National Vitality* where a probable economic loss of $1,500,000,000 from preventable disease and death was estimated, based on the consensus of opinion of leading medical authorities.

		No. of Lives
Expected mortality per 1,000 in population examined; conservative figures for average population at work		10
Probable number of substandard or physically impaired lives per 1,000 in population examined		300
Expected mortality *without examination* per 300 substandard lives		6
Probable mortality *with examination* per 300 substandard lives		3
Gain in mortality (lives per annum) in substandard group		3
Add at least one life saved in standard group		1
Economic value of average life		$5,000
(Formula of Dublin and Whitney based on exact computation of basic factors, increment of wealth, etc. Value of 1 year of life $100×50 [average lifetime] $5,000, economic value of average life.)		
Mortality gain to state for each 1,000 examined (4 lives× $5,000)*	$	20,000
Assuming 2 people constantly ill for each death occurring in group, the saving of 4 lives means the elimination of 8 cases of chronic illness from the group, or a reduction of 8×365, or 2,920 days of illness. At a medical, nursing and extra diet cost for illness of $3 per day, the saving equals about		9,000
Profit to state and community per 1,000 of population	$	29,000
Applying this factor to a population of 105,000,000 which would exclude the extremely aged and infirm who would not come under the operation of these formulae, we have the following exhibit: 105,000,000×$29 equals about		$3,045,000,000

* Adapted from Irving Fisher, *Report on National Vitality, Its Wastes and Conservation,* p. 34. (Government Printing Office, 1909.)

[61a] Adapted from *Waste in Industry,* pp. 354–56 (published by Federated American Engineering Societies, Washington, D.C., 1921), as quoted in Douglas, Hitchcock, and Atkins, *The Worker in Modern Economic Society,* pp. 439–40. (University of Chicago Press, 1926.)

What would be the cost of applying a system of periodic examination to the entire population?	
If there were thorough organization of such work the cost would not exceed $5 per individual—a total of	$ 525,000,000
leaving an economic balance of	$2,520,000,000
Assuming that one-third of the substandard cases revealed by these examinations or about 10,000,000 required medical, surgical or dental treatment at a cost of $100 per case, the cost of this repair work would aggregate	1,000,000,000
leaving a net margin of economic gain of	$1,000,000,000
also excess dividends in: Health; Happiness; Satisfaction in Living; Prevention of Pain; Prevention of Sorrow; Prevention of Discontent; and Industrial Unrest.	

5. THE ENERGIES OF MEN[62]

Everyone knows what it is to start a piece of work, either intellectual or muscular, feeling stale—or *oold,* as an Adirondack guide once put it to me. And everybody knows what it is to "warm up" to his job. The process of warming up gets particularly striking in the phenomenon known as "second wind." On usual occasions we make a practice of stopping an occupation as soon as we meet the first effective layer (so to call it) of fatigue. But if an unusual necessity forces us to press onward, a surprising thing occurs. The fatigue gets worse up to a certain critical point, when gradually or suddenly it passes away, and we are fresher than before. We have evidently tapped a level of new energy, masked until then by the fatigue-obstacle usually obeyed. There may be layer after layer of this experience. A third and a fourth "wind" may supervene. Mental activity shows the phenomenon as well as physical, and in exceptional cases we may find, beyond the very extremity of fatigue-distress, amounts of ease and power that we never dreamed ourselves to own—sources of strength habitually not taxed at all, because habitually, we never push through the obstruction, never pass those early critical points.

It is evident that our organism has stored-up reserves of energy that are ordinarily not called upon, but that may be called upon:

[62] Adapted with permission from William James, "The Energies of Men," in *Memories and Studies,* pp. 229–63. (Longmans, Green, & Co., 1911.)

deeper and deeper strata of combustible or explosible material, discontinuously arranged, but ready for use by anyone who probes so deep, and repairing themselves by rest as well as do the superficial strata. Most of us continue living unnecessarily near our surface.

If my reader will put together two conceptions, first, that few men live at their maximum of energy, and second, that anyone may be in vital equlibrium at very different rates of energizing, he will find, I think, that a very pretty practical problem of national economy, as well as of individual ethics, opens upon his view. In rough terms, we may say that a man who energizes below his normal maximum fails by just so much to profit by his chance at life; and that a nation filled with such men is inferior to a nation run at higher pressure. The problem is, then, how can men be trained up to their most useful pitch of energy? And how can nations make such training most accessible to all their sons and daughters? This, after all, is only the general problem of education, formulated in slightly different terms.

"Rough" terms, I said just now, because the words "energy" and "maximum" may easily suggest only *quantity* to the reader's mind, whereas in measuring the human energies of which I speak, qualities as well as quantities have to be taken into account. Everyone feels that his total *power* rises when he passes to a higher *qualitative* level of life.

Let no one think that our problem of individual and national economy is solely that of the maximum of pounds raisable against gravity, the maximum of locomotion, or of agitation of any sort, that human beings can accomplish. That might signify little more than hurrying and jumping about in inco-ordinated ways; whereas inner work, though it so often reinforces outer work, quite as often means its arrest. To relax, to say to ourselves (with the "new thoughters") "Peace! be still!" is sometimes a great achievement of inner work. When I speak of human energizing in general, the reader must therefore understand that sum-total of activities, some outer and some inner, some muscular, some emotional, some moral, some spiritual, of whose waxing and waning in himself he is at all times so well aware. How to keep it at an appreciable maximum? How not to let the level lapse? That is the great problem.

The first point to agree upon in this enterprise is that *as a rule*

men habitually use only a small part of the powers which they actually possess and which they might use under appropriate conditions.

Admit so much, then, and admit also that the charge of being inferior to their full self is far truer of some men than of others; then the practical question ensues: *to what do the better men owe their escape? and, in the fluctuations which all men feel in their own degree of energizing, to what are the improvements due, when they occur?*

In general terms the answer is plain:

Either some unusual stimulus fills them with emotional excitement, or some unusual idea of necessity induces them to make an extra effort of will. *Excitement, ideas and efforts* in a word, are what carry us over the dam.

6. THE QUALITY OF POPULATION

A. NON-SURVIVAL OF THE FITTEST[63]

My thesis is this: that the indisputable effect of the state of social progress and culture we have reached, of our high civilization in its present stage and actual form, is to *counteract and suspend* the operation of that righteous and salutary law of "natural selection" in virtue of which the best specimens of the race—the strongest, the finest, the worthiest—are those which survive, multiply, become paramount, and take precedence; succeed and triumph in the struggle for existence, become the especial progenitors of future generations, continue the species, and propagate an ever improving and perfecting type of humanity.

The principle of the "Survival of the Fittest" does not appear to fail in the case of *races* of men. Here the abler, the stronger, the more advanced, the finer, in short, are still the favored ones, succeed in the competition. The principle of "natural selection" therefore—of the superior and fitter races of mankind trampling out and replacing the poorer races, in virtue of their superior fitness—would seem to hold good universally.

So probably it does also, and always has done, in the case of *nations;* and the apparent exceptions to the rule may be due only to our erroneous estimate of the true elements of superiority.

[63] Adapted from W. R. Greg, *Enigmas of Life,* chap. iii. (Trübner & Co., 1872.) The substance of the passage originally appeared in *Fraser's Magazine* (London), September, 1868.

But when we come to the case of individuals in a people, or classes in a community—the phase of the question which has far the most practical and immediate interest for ourselves—the principle would appear to fail, and the law is no longer supreme. Civilization, with its social, moral, and material complications, has introduced a disturbing and conflicting element. It is no longer the strongest, the healthiest, the most perfectly organized; it is not men of the finest *physique,* the largest brain, the most developed intelligence, the best *morale,* that are "favored" and successful "in the struggle for existence"—that survive, that rise to the surface, that "natural selection" makes the parents of future generations, the continuators of a picked and perfected race. The various influences of our social system combine to traverse the righteous and salutary law which God ordained for the preservation of a worthy and improving humanity; and the "varieties" of man that endure and multiply their likenesses, and mold the features of the coming times, are not the soundest constitutions that can be found among us, nor the most subtle and resourceful minds, nor the most amiable or self-denying tempers, nor the most sagacious judgments, nor even the most imperious and persistent wills, but often the precise reverse—often those emasculated by luxury and those damaged by want, those rendered reckless by squalid poverty, and those whose physical and mental energies have been sapped, and whose characters have been grievously impaired, by long indulgence and forestalled desires.

Among wild animals the sick and maimed are slain; among savages they succumb and die or are suppressed; among us they are cared for, kept alive, enabled to marry and multiply. In uncivilized tribes, the ineffective and incapable, the weak in body or in mind, are unable to provide themselves food; they fall behind in the chase or in the march; they fall out, therefore, in the race of life. With us, sustenance and shelter are provided for them, and they survive. We pride ourselves—and justly—on the increased length of life which has been effected by our science and our humanity. But we forget that this higher average of *life* may be compatible with, and may in a measure result from, a lower average of *health.* We have kept alive those who, in a more natural and less advanced state, would have died—and who, looking at the physical perfection of the race alone, had better been left to die. Among savages, the vigorous and sound alone survive;

among us, the diseased and enfeebled survive as well; but is either the physique or the intelligence of cultivated man the gainer by the change?

Of course it will be urged that the principle of natural selection fails thus utterly because our civilization is imperfect and misdirected; because our laws are insufficient; because our social arrangements are unwise; because our moral sense is languid or unenlightened. No doubt, if our legislators and rulers were quite sagacious and quite stern, our people in all ranks quite wise and good, the beneficent tendencies of nature would continue to operate uncounteracted. No constitutions would be impaired by insufficient nutriment and none by unhealthy excess. No classes would be so undeveloped either in mind or muscle as to be unfitted for procreating sound and vigorous offspring. The sick, the tainted, and the maimed would be too sensible and too unselfish to dream of marrying and handing down to their children the curse of diseased or feeble frames; or if they did not thus control themselves, the state would exercise a salutary but unrelenting paternal despotism, and supply the deficiency by vigilant and timely prohibition. A republic is *conceivable* in which paupers should be forbidden to propagate; in which all candidates for the proud and solemn privilege of continuing an untainted and perfecting race should be subjected to a pass or a competitive examination, and those only be suffered to transmit their names and families to future generations who had a pure, vigorous, and well-developed constitution to transmit; so that paternity should be the right and function exclusively of the élite of the nation, and humanity be thus enabled to march on securely and without drawback to its ultimate possibilities of progress. Every damaged or inferior temperament might be eliminated, and every special and superior one be selected and enthroned, till the human race, both in its manhood and its womanhood, became one glorious fellowship of saints, sages, and athletes; till we were all Blondins, all Shakespeares, Pericles', Socrates', Columbuses, and Fénelons.

But no nation—in modern times at least—has ever yet approached or aimed at this ideal; no such wisdom or virtue has ever been found except in isolated individual instances; no government and no statesman has ever yet dared thus to supplement the inadequacy of personal patriotism by laws so sapiently despotic. The faces of the leading peo-

ples of the existing world are not even set in this direction—at present notably the reverse. The more marked tendencies of the age are three; and all three run counter to the operation of the wholesome law of "natural selection." We are learning to insist more and more on the freedom of the individual will, the right of everyone to judge and act for himself. We are growing daily more foolishly and criminally lenient to every natural propensity, less and less inclined to resent, or control, or punish its indulgence. We absolutely refuse to let the poor, the incapable, the lazy, or the diseased die; we enable or allow them, if we do not actually encourage them, to propagate their incapacity, poverty, and constitutional disorders. And, lastly, democracy is every year advancing in power, and claiming the supreme right to govern and to guide; and democracy means the management and control of social arrangements by the least educated classes—by those least trained to foresee or measure consequences, least acquainted with the fearfully rigid laws of hereditary transmission, least habituated to repress desires, or to forego immediate enjoyment for future and remote good.

B. EUGENICS[64]

The quality of the population has only within a few years begun to command from economists and other students of social problems the attention which so important a topic deserves. The influence of Malthus, at the beginning of the last century, committed the economic opinion of that period to the already prevalent view that questions of wise public policy in regard to population were essentially questions of mere numbers—the number of men who could be compelled to fight, labor, or pay taxes, and the numerical proportion between existing food-supply and the human beings to be fed. Almost no one then recognized the menace of the unequal increase of social and economic classes unequally endowed with the mental and physical characteristics which make for success. Indeed, the inequalities of innate human capacity were little appreciated until Darwin's *Origin of Species*, by pointing out the rôle of inherited variations throughout the animal world, suggested how far-reaching might be the effect of hereditary defects and abilities in determining the careers of individual men, and even the whole course of civilization. This suggestion presently led

[64] By James A. Field.

the late Sir Francis Galton to publish—tentatively, at first, in 1865, and later, in 1869, in his classic *Hereditary Genius*—an impressive array of evidence bearing on the inheritance of human talents and aptitudes, and an epoch-making argument in favor of selective improvement of the human breed as a promising means of increasing human welfare. Subsequently Galton adduced new proofs of hereditary ability; won new followers to his project of race-betterment, and raised the program of investigations which he had begun to the level of an incipient science, bearing the name, "Eugenics."

"Eugenics," in the words of Galton, "is the study of agencies under social control that may improve or impair the racial qualities of future generations either physically or mentally." Primarily it is the study of human heredity and of social influences which act, through heredity, for racial degeneracy or racial improvement.

Practical attempts to apply existing knowledge of heredity in the betterment of racial quality fall under two heads: positive, or constructive eugenics, and negative, or restrictive eugenics. On the one hand we may attempt to develop a better human type; on the other, we may content ourselves with eliminating the worst lapses from the normal type which now exists. Whichever program is adopted, applied eugenics must work mainly through the force which eugenic teaching can bring to bear on marriage selection. The course of each procedure is therefore likely to be obstructed by ignorance, inertia, prejudice, and the reluctance, desirable or undesirable, which is aroused by any attempt to transfer marriage and parenthood from the sway of the emotions to the domain of reason. But apart from this general difficulty, positive and negative eugenics have their special and respective limitations. Positive eugenics is particularly uncertain. Even if the powers of heredity were completely understood and entirely amenable to our control, we should lack adequate understanding of the most desirable human type to create. We cannot assume that abilities which now bring exceptional advantages to exceptional individuals would offer equal advantages to all if possession of these abilities became universal. Negative eugenics, indirectly, is beset by the same uncertainty. More immediately, it involves restraint which, if practiced at all, would probably be practiced more vigorously by the more thoughtful members of the community, with the result of still further aggra-

vating the disproportion between the slow increase of the intellectual classes and the teeming multiplication of the ignorant and improvident. On the whole, however, negative eugenics seem thus far the more hopeful. Within limits, and in cases where the action of heredity is highly definite, such restriction of non-eugenic marriages, by social compulsion or from individual sense of duty, holds out the prospect of a real reduction of human suffering. To this end, therefore, the advocates of eugenics, in growing numbers, are working. How far their efforts have a scientific justification is yet to be proven.

C. EUTHENICS[65]

The selective devices of eugenics must be supplemented by environmental methods if they are to be rendered ultimately effective in peopling the earth with desirable types. In fact it is only through environmental control that eugenic control is possible. The thought and methods connected with these efforts toward controlling and improving environment compose the new science of euthenics. It has been defined as "The betterment of living conditions, through conscious endeavor, for the purpose of securing efficient human beings." Its purpose is to provide opportunity for the fullest achievement of human potentialities, to give the germ plasm its maximum chance, and to secure the greatest efficiency under present conditions. The rose may grow in the desert, but not so well.

It is also true that euthenics, if carried into effect on as large a scale as possible, can do much to bring to fruition many latent elements of quality in the contemporary population; it may even remove the conditions that now cause congenital, natal, and postnatal causes of degeneracy. Certainly with good conditions of environment generally in effect we can have an immeasurably more efficient society than we now have. Even relatively mediocre stuff can be fairly good with maximum opportunity and stimulation. It is also true that many defects, especially mental defects, generally accepted in eugenic studies as of hereditary determination may readily be recognized as due to social conditions, rather than as expressing specific hereditary traits. In this connection Boas writes,

[65] Adapted from Joyce O. Hertzler, *Social Progress*, pp. 333–35. (New York and London: Century Co., 1928.)

> A weakling who is economically well situated is protected from many of the dangers that beset an individual of similar characteristics whose economic condition is not so favorable, and it must be admitted that criminality in families that may be mentally weak and which are at the same time struggling for the barest subsistence is at least as much determined by social conditions as by heredity. . . . . We should be willing to admit that among the poor undernourished population, which is at the same time badly housed and suffers from other unfavorable conditions of life, congenital weakness may develop which lowers the resistance of the individual against all forms of delinquency.

Similarly environmental conditions are capable of shaping this more or less plastic hereditary material on good lines. Therefore euthenic agents offer expedients in improving the quality of the population that no progressive can deny or treat lightly.

Euthenics is concerned with a vast mass of most complex variables. There are, for example, intimate relations between racial improvement and economic conditions. Certain economic conditions now oppress a very large proportion of the population. But good economic conditions afford conditions under which the operation of eugenic ideals would doubtless be more effective than now. A greater equality in the distribution of wealth would tend to bring about a greater equality in the birth-rate of different classes. The right environmental conditions can also prevent the waste of potential mental energy. If the environment is properly stimulating, it will direct the energies of men towards socially advantageous achievements. It is generally thought that if the masses are given a suitable opportunity to develop and use their brain capacity much unexpected achievement will come. The fact that the upper classes alone have had the opportunities is no insignificant reason for their contributions to progress. The environment may provide or withdraw the racial poisons, the germs and pests, that have such ability to exercise weal or woe among human beings.

Among the innumerable euthenic possibilities and activities of the present moment are the following: applied science in all its forms—its sanitary, hygienic, dietetic, and medical uses, its domestic applications, its use in all the various departments of engineering and industry; education in sex, culture, vocation, personal care and hygiene, homemaking and parenthood; laws which make for health and the prevention of disease, such as pure food and drug laws, quarantine

laws, sanitary laws, factory and labor laws, as well as organizations and ideals directed to the same end; all that is done to prevent industrial disease, accidents, the employment of women and children under certain conditions; cheaper and more adequate food supplies; better housing; shifting the incidence of taxation to those best able to carry it; the regulation of corporations; safe and adequate water supply; cheaper hospitals, sanatoria, and medical and surgical service; better distribution of wealth and income; better distribution of population; provision of gymnasia, playgrounds, parks, and other opportunities for recreation; elimination of vice; more scientific and constructive social work; and hosts of others.

7. THE PROBLEM STATED[66]

The population question, important everywhere, is today most pressing in the United States. The problem in the countries of Europe and Asia is acute enough; but the issue is clearer, because those parts of the world have practically reached a saturation point and possess in most cases a population fairly homogeneous with reference to blood and culture. In this country, the future is still in the making. It is not too much to say that the hope of the world rests on a happy and successful solution of our population quesion. Canada, Australia, and the South American states are facing much the same problem as we are, and any conclusions we may reach will be of great value to them also.

The population problem of the United States has two main aspects: the first quantitative, and the second qualitative. Under the first is implied an understanding of the facts of our population both from the point of view of structure and of movement, in the past and currently. It presupposes a consideration of the possibilities of future growth, the determination of the maximum numbers which can be supported, and when this figure is likely to be reached. Our discussion must include also the relationship between the increase in numbers and the natural resources of the country—agricultural, mineral, and littoral.

Under the second or qualitative aspect of our discussion we are thinking about such elements as the present constitution of the coun-

[66] Adapted from Louis I. Dublin, "The Statistician and the Population Problem," *Journal of the American Statistical Association*, XX, Nos. 149–52 (1925), 3–4.

try racially, the contribution which the various racial stocks have made to our common cultural life, and our attitude regarding the future composition of the country. This involves the discussion of a rational immigration policy. There is, however, another consideration which is neither exclusively quantitative nor purely qualitative in character but partakes of both and must receive very careful consideration. Our future well-being will depend upon the standards of life we desire, upon the efficiency with which we manage our resources, and upon the efficient training and direction of our labor supply with regard to the utilization of the labor of the women and children.

We seek to formulate a program, outline a technique, and present a goal for the future. We will attempt to sketch the type of civilization that we may hope to achieve; its internal economic and social organization; the composition and organization of the family unit. We must endeavor to understand how the age at marriage will influence the size of the family; the part played by schooling and training; what conditions best enable the individual to cope with his environment; what vocational equipment is necessary; whether the public health movement and the improvement in environmental conditions have contributed to an increase of the weaklings of society; whether our vast system of charitable and poor relief has only served to provide a cheap but inadequate labor supply. We must seek constantly to keep in touch with the facts as they develop from day to day, so that we may always gauge the changes that occur, and determine whether we are working toward our objective or have deviated from it; we must decide in what direction we are going, and to what ultimate end.

CHAPTER VI

THE PERSONAL FACTOR IN PRODUCTION: ENTERPRISE AND MANAGEMENT

Purposes of this chapter:

1. To sense the part which must be played by enterprise in any economic order.
2. To understand the character of the problems that confront the management of modern business.
3. To see some of the types of solution which management has found for these problems.
4. To study the recent movement for more effective control or management.
5. To reflect upon the position of management in the modern economic order.

Our economic order is organized primarily in terms of individual initiative—and this remains true although the individual is much under social control. In this society of individual initiative, the individual (or voluntarily formed groups of individuals) is responsible for two vastly important lines of activity: (1) He decides (in the light of the promptings of the gain spirit) what to produce and how much to produce, and (2) he organizes factors of production and administers or manages the enterprise. In other words, the individual becomes responsible in our society for the "enterprise" function and also for the function of "management."

Our main consideration of the enterprise function must be postponed to Part III. At present we need only the foregoing preliminary statement as a setting to the discussion of management.

If one assumes or takes for granted the physical environment, modern management may be said to be conditioned by four overlapping, interacting factors (possibly they should be called variables): (1) technological matters, (2) price, (3) social environment, (4) continuous change of each of the foregoing.

Modern management has much to do with technological considerations. The development of such sciences as physics, chemistry, psychology, geology has made available for practical application a great store of knowledge, and such vast practical application has been made that modern business is highly technological in character. The precise form of the technology will vary from business to business, and from one aspect to another of a given business. The general statement may be made, however, that the manager of a "manufacturing and selling" business will continually come into contact with technological problems, the proper administration of which will require training in such fields as physics, chemistry, geology, psychology, and the biological sciences, the field varying with varying circumstances.

This is, of course, no place to consider all, or even many, of these technological problems. There is, however, one such problem which is so pervasive and so basic to economic science that it must be taken up. This is the problem of the effective proportioning of the factors of production. The difficulty of this problem may be visualized by considering the following hypothetical case: Let the trustees of some great endowment go to the works manager with this proposal: "We intend to free you from everything except technical problems. Disregard price and financial policy entirely. Take any grade or grades of land, take any grade or grades of labor; take any of the present forms of capital goods and take any or all of these in any quantity you choose. Work out in turn for each factor the best technical combination." The problem would be a formidable, even a staggering, one, able as the works manager would be to summon to his aid the fruits of generations of development in mechanical engineering. Years of patient research would be required. This situation is not peculiar to the works management. It exists in every department of a business.

Baffling as are the technological aspects of the business man's problem, they are after all but the beginning of his difficulties. These technological difficulties are all shot through and through with variables of value and price. Management may not take any grade of land in any quantity it chooses; it may not select any grade of labor in any quantity it chooses; it may not utilize any existing form of capital goods in any quantity it chooses. In every case *price* enters, and management must ask such questions as these: "Will this grade of land

for which I must pay x dollars be better for me than that grade of land for which I must pay y dollars? Shall I use this grade of labor at this given price, or would it be better for me to use another grade of labor at a different price? Shall I use this particular machine at this price, or shall I use one of the scores of other machines which will be furnished me at different prices; or shall I substitute labor for machinery?" And granted that management finds some solution of these questions, price is again of significant consideration in the disposal of the product. In all of these price intricacies the business man is largely the victim of circumstances. Unless he has monopoly power, he has as an individual very little to say concerning the price at which he may secure any factor of production, and still less to say concerning the price at which he may dispose of his product. In the pecuniary aspects of his problem he is grappling with forces which he must understand if possible, but which he can do little to control.

Still further complicating the business manager's technological problems, shot through and through as they are with the variables of price, is the factor (variable)—social environment. The modern business manager is not conducting his business up in thin air, nor is he located on a desert island. He is in the midst of organized society, and his operations are subject—more than he is likely to realize in our individualistic régime—to what we have come to call social control, both formal and informal, both conscious and unconscious. Quite aside from social control in the ordinary sense, the organization of society, with its whole psychological and institutional background, lays down limits to his freedom of operation. But this has already been sufficiently discussed for our present purposes.

And there is a fourth factor—or variable, or characteristic aspect, of all the foregoing factors—continuous change, the influence of progress, and this crisscrosses all the other factors. There are changes in technique, some of which may result from an intensive study of his own business and some of which may be forced upon him, in this pecuniary, gain-organized, competitive business world, by outside inventions. The methods of production or of marketing may be revolutionized within a few years. There are changes in the price factor, some brought about by his own action, some brought about by the action of competitors, some forced upon both him and his competitors by hap-

penings that to the lay mind have no conceivable bearing upon the business concerned. There are changes in the social environment, and these are typically little under his control. Indeed, in general terms the individual will have little influence in determining any or all of these possible changes. None the less, the slightest misjudgment of the actual course of events often means for the business but one outcome, failure. Woe to the business executive whose training gives him a static conception of business problems!

In the discussion which follows the following aspects of the problem of management are taken up for more detailed consideration: (1) the technological aspects of the problem of proportionality, (2) types of cost and the behavior of costs, (3) organization for the purpose of control, and (4) the position of management in the economic order.

A. The Technological Problems of Proportionality

The problem of the effective technical proportioning of the factors of production which is so pervasive and so basic to economic science, and so baffling, arises out of inherent characteristics of the conditioning factors of production.

All agencies of production are limited in three respects. First, within a given period of time and in terms of a given state of the arts there is always a positive physical limitation to the amount or extent of certain natural resources, labor and capital. Second, a given resource, particularly a natural resource, may be used up or exhausted over a period of time. Third, in the process of applying one kind or group of factors of production to another factor of production "resistance" may be encountered and a technological law of diminishing returns may become operative. We are here concerned with the third limitation.

In the discussion which follows, these assumptions or conditions must be kept in mind: (*a*) We shall be speaking in terms of what holds true as of a given instant of time; (*b*) we shall proceed on the assumption that no changes in the cultural environment are taking place, i.e., that there is a given state of the arts; and (*c*) we shall be concerned solely with technological or physical consideration, i.e., matters of value or cost will not enter into our calculations.

With these assumptions or conditions in mind, let one agent of

production, let us say land, be kept constant in both quantity and quality while the experiment is performed of applying varying numbers of doses (additional doses) of labor and capital to it in the production of, let us say, wheat. During the stages of the experiment in which only a small number of doses of labor and capital are applied to this land, the application of an additional dose may result in an increase in the amount of wheat produced greater than the increase resulting from the last preceding dose. But if we continue to apply additional doses of labor and capital to the land, a point is reached when an additional dose of labor and capital not only adds less to the product than did the last preceding dose, but even adds less than a *proportional* (proportional to the number of doses) amount to the total product. This is the point at which we speak of the technological law of diminishing returns as beginning to operate. This is the point at which the product per unit of the variable factor recedes from the maximum.

As applied to land, the principle may be stated thus: In a given state of the arts, after a certain proportioning or combination of the factors of production has been attained, an increased application of labor and capital (one or both) to a given area of land will yield a less than proportional increase of product.

The foregoing illustration of the "law of diminishing returns" has been worked out in terms of land remaining the constant factor. Because in many respects natural resources are our most definitely limited factor of production, this method of illustrating the "law" is frequently found in economic literature. The law is, however, of universal application; it holds as true of the other factors of production as it does of land.

We know no way of "abolishing the law of diminishing returns"; it expresses a physical fact. Its evil consequences may, however, be "staved off" by opening up to use new quantities of the more limited factors of production, by improvement in the arts, etc. Be it remembered, however, that these do not wipe out the law of diminishing returns: they merely cause its operation to be on a new level.

When reading the following selections it will be helpful to have these[1] issues in mind:

[1] A more detailed statement of issues may be found in *Outlines of the Economic Order*, pp. 153–59. (The University of Chicago Press.)

1. Admitting that the engineer is and should be interested in the effective proportioning of the elements of production, why or wherein is the economist interested?
2. What assumptions or provisos must be included in a correct statement of the "law of diminishing output"?
3. What factors or forces have in practice served to stave off the evil effects of the law of diminishing output?

1. THE INSTRUMENTAL LAW OF DIMINISHING RETURNS[1a]

It is a fact too evident to need argument that substantially all productive processes are joint processes—processes wherein two or more factors co-operate in accomplishing the result. Land by itself can produce no considerable quantity of potatoes; labor by itself can produce none; a furnace cannot give out heat without coal; feeding the coal to the furnace needs labor; and so on.

Again, it is too evident to need argument that the productivity of any joint or co-operative process varies more or less with changes in the combining proportion. Thus, increasing the quantity of labor used in cultivating a certain piece of land would probably make the total product greater, though it might make that product smaller. Further, in case it made the product greater, the increase might be in exact proportion to the increase in labor or it might be in a larger or smaller proportion. Similar statements could be made of other combinations of factors, say a locomotive and the coal used in firing it. If we had just started the fire, a certain increase in the coal fed might increase the water evaporated much more rapidly than the increase in water evaporation, but one which was less than proportional to the increase in fuel consumption. Still later the increase in fuel consumption might bring no increase in evaporation; and, finally, might even diminish it.

The effects produced by changes in combining proportions may be looked at either (1) on the merely physical side, or (2) economically—meaning by "economically" in such a way as to include those consequences which involve value questions. We begin with the purely physical side.

1. *Imaginary experiments with imaginary combinations contain-*

[1a] Taken by permission from F. M. Taylor, *Principles of Economics*, pp. 94–102. (University of Michigan, 1916.)

ing two divisible factors.—In order to give precision and definiteness to our ideas, we will deal with the imaginary results of a series of imaginary experiments with two imaginary factors which we will designate A's and B's respectively.

a) Factor A constant, Factor B increasing: In making our imaginary experiments, we suppose ourselves to use each time 20 A's and combine with these, first 2 B's, then 3 B's, then 4 B's, and so on. The actual combinations and the results which we suppose to appear are represented in the accompanying table. As already indicated, the factors, the combinations, and the results are purely imaginary. No series of combinations used in the real world would correspond to this. But the careful study of the figures of some such table as this is after all pretty nearly essential to a full and clear comprehension of the real cases.

In this table the first column shows the number of the combination; the second, the amount of A's in the combination; the third, the amount of B's; the fourth gives the output or product for each combination; the fifth shows what the increase in output would be if it were proportional to the increase in B's; while the sixth shows the actual increase. Comparing columns V and VI, we see that increases in output are more than proportional up to combination 9; less than proportional from 9 to 19; and turn into decreases from 19 on. That is, looked at from one point of view anyhow, the different combinations naturally break into three stages or groups, which stages may be characterized as follows: (1) output increasing more than proportionately or at an increasing rate, (2) output increasing less than proportionately or at a diminishing rate, (3) output diminishing.

NOTE.—The third of the three stages through which our combinations pass is usually ignored, since no one would intentionally work an instrument of production in this stage. The first and second are commonly designated the Stage of Increasing Returns and Stage of Diminishing Returns. Much is to be said in favor of substituting "output" for "returns" in these phrases, in order to avoid an ambiguity present in the word "returns." For "returns" may mean profits, the money gain of the entrepreneur; and with this our principle has nothing to do. We are asking about the effect of changing combining

proportions on the output of goods, not on the gains of the entrepreneur. Our present problem is one of industrial technique, not business finance. It is doubtless true that changes in the technical results influence financial results, profits; but they are not alone in determin-

I	II	III	IV	V	VI
No. of Combination	Amount A's	Amount B's	Output	Proportional Increase	Actual Increase
1	20	2	2	....	....
2	20	3	6	1	4
3	20	4	16	2	10
4	20	5	35	4	19
5	20	6	84	7	49
6	20	7	126	14	42
7	20	8	156	18	30
8	20	9	179	19.5	23
9	20	10	200	19.8	21
10	20	12	236	40	36
11	20	14	266	39	30
12	20	16	290	38	24
13	20	18	312	36	22
14	20	20	330	34	18
15	20	22.2	346	36	16
16	20	25	362	43	16
17	20	28.5	380	50	18
18	20	33.3	393	63	13
19	20	40	400	78	7
20	20	44.4	398	44	− 2
21	20	50	393	50	− 5
22	20	57.1	360	56	− 33
23	20	66.6	280	60	− 80
24	20	80	140	56	−140
25	20	100	80	35	− 60
26	20	133.3	40	26	− 40
27	20	200	20	20	− 20

ing such financial results, what we say about the one does not without qualification apply to the other.

b) Factor B Constant, Factor A Changing: In the preceding series of experiments, A was supposed to remain constant while B increased. If, now, we were to reverse the hypothesis, keeping B constant and increasing A, what results should we have? Precisely similar ones to those already brought out, with the places of A and B

reversed. That is, for a time output would increase more than proportionately to the increase in A, then would increase less than proportionately, and finally would diminish. And this is not a new principle based upon a new induction. On the contrary, a table reversing the relations of A and B as to both conditions and results is directly deducible from the table already given. From this fact it follows that, if the principles already hypothetically brought out prove to be true in fact for a combination in which one factor, say capital, is constant, while the other, say labor, is increasing, then similar principles must be true of combinations in which the second factor, labor, is constant and the first factor, capital, is increasing.

2. *Actual combinations show similar phenomena.* The points brought out above with respect to the effects on output caused by changes in combining proportions were based on the imaginary results of imaginary experiments. Do they represent in general what we meet in actual life? The answer is, of course, affirmative.

Principle.—Supposing that the attempt be made in successive production periods to increase the output (product) from an instrument of production by increasing the expenditure of assisting factors in connection with said instrument from zero upward, then, as respects the ratio output (product) to expenditure for assisting factors, said instrument will sooner or later be found in each of the following stages, viz.: (1) output increasing more than proportionately (at increasing rate); (2) output increasing less than proportionately (at diminishing rate); (3) output decreasing.

Principle: The instrumental law of diminishing returns.—In the process of attempting to utilize more completely any productive instrument by increasing the amount of the assisting factors combined with it—in other words, by expending more upon it—there comes a stage during which output, though continuing to increase, does so more slowly than the assisting factors are increased—it being assumed that all other conditions are unchanged, there being no improvement in technical methods, no deterioration in the instrument, and so on.

2. AN ARITHMETICAL ILLUSTRATION OF THE LAW OF DIMINISHING RETURNS

A	B	C	D	E

A certain homogeneous strip of land was divided into five equal parts. These equal areas had the same exposure to the sun and weather, and soil analysis demonstrated that, humanly speaking, they were equal in every particular.

On strip A, the application of 100 doses of labor, capital and organization resulted in a yield of 200 bushels of product.

On Strip B the application of 200 doses of precisely the same kinds of labor, capital and organization resulted in a yield of 350 bushels. This yield was, of course, equivalent to 200 bushels for the first 100 doses and 150 bushels for the second 100 doses.

On strip C the application of 300 doses of this labor, capital and organization resulted in a yield of 450 bushels of product, or 200 bushels for the first 100 doses, 150 bushels for the second 100 doses and 100 bushels for the third 100 doses.

On strip D the application of 400 doses of this labor, capital and organization yielded 500 bushels of product, or 200 bushels for the first 100 doses, 150 bushels for the second 100 doses, 100 bushels for the third 100 doses, and 50 bushels for the fourth 100 doses.

On strip E, the application of 500 doses of this labor, capital and organization, resulted in 500 bushels of product. Obviously enough the last 100 doses of labor, capital and organization yielded 0 bushels of product; in other words the returns to the last 100 doses had diminished to nothing, and the cultivation of the land had reached that stage known as maximum returns.

3. FORMULAE OF THE LAWS OF RETURN[2]

Each business or industrial unit, such as a farm, a store, or a factory, is a combination, under one management, of various factors of production which are usually included under the three heads, — land,

[2] Adapted from T. N. Carver, *The Distribution of Wealth* (1904), pp. 65–91. Reprinted by permission of The Macmillan Company, publishers.

labor, and capital. Among the various questions which the manager of such a unit has to determine are the two following: 1. What is the best *proportion* in which to combine the various factors? 2. What is the best *size* for the whole business unit? The law of diminishing returns has to do only with the former of these questions.

The difference between these two laws can be expressed in a more compact form by means of the following formulae, which are not to be understood as in any sense proving the existence of the laws, but only as expressing them in convenient form.

	Acres of Land		Units of Labor and Capital		Product
I. If	X	with	Y	will produce................	P
II. Then	X	with	aY	will produce....	less than aP (Diminishing returns.) more than aP (Increasing returns.)
III. And	aX	with	aY	will produce....	less than aP (Diminishing economy of large-scale production.) more than aP (Increasing economy of large-scale production.)

It is assumed that a is a positive quantity greater than 1.

In formula II it will be observed, the *proportion* in which the factors are combined is not the same as in formula I, land remaining the same while labor and capital are increased by a. In formula III, however, the proportion is the same as in I, all the factors being increased in the same proportion; but the *size* of the whole combination is increased.

For the present we are concerned only with the law of diminishing returns, whose expression is:—

	Acres of Land		Units of Labor and Capital		Product
1. If	X	with	Y	will produce.........	P,
2. then	X	with	aY	will produce more than P, but less than aP.	

This is the condition which exists wherever men find it to their advantage to extend their cultivation to any but their best land.

From the above formula we may therefore derive the following:

	Acres of Land		Units of Labor and Capital		Product
If	X	with	Y	will produce..........	P,
IV. then	aX	with	Y	will produce more than P, but less than aP.	

Thus the law of diminishing returns, originally applied to the product of a given amount of land under varying applications of labor and capital, is capable of being reversed and applied to the product of a given amount of labor and capital when applied to varying amounts of land. The principle is the same, and the expression is similar in both cases.

But the principle can be still further extended by separating labor and capital and representing them as two factors, instead of lumping them together, as has been done thus far in the discussion. Indeed, there is every reason for so separating them, for labor and capital do not belong in the same class. They are no more alike than are labor and land, or capital and land. Moreover, if it is true that an increase in the amount of labor and capital on the same amount of land will not increase the product as much as the labor and capital are increased, it is equally true, and for the same reasons, that an increase in the amount of labor on a fixed amount of land and capital, or an increase in the amount of capital used with a fixed amount of land and labor, will not increase the product as much as the variable factor in either case is increased. The statement can therefore be enlarged by adding the following formulae to those given above:—

	Acres of Land		Units of Labor		Units of Capital		Product
V. If	X	with	Y	with	Z	will produce.........	P,
VI. then	X	with	aY	with	Z	will produce more than P but less than aP,	
VII. and	X	with	Y	with	aZ	will produce more than P but less than aP.	

We have not yet reached a good stopping-place in our extension of the principle of diminishing returns. The grouping of the factors of production into the three classes, labor, land, and capital, is by no means final. There are various kinds of labor, of land, and of capital. Two different kinds of labor may be performing functions which differ almost as widely as those performed by labor and capital, or by labor and land. The work of a bookkeeper differs as widely from that of a ditch digger, as that of a ditch digger does from that of a steam shovel. Therefore, the same reasons which favor the separation of labor and capital, in order that they may be treated as distinct factors, will also favor the separation of one kind of labor from another, of one kind of capital from another, and of one kind of land from another.

A complete formula which should show every possible application of this extension of the law of diminishing returns requires a separate term for each and every kind of labor, capital, and land. But such a formula would be long and unwieldy. The following simple formula, though incomplete, will have to suffice.

	Units of Any One Kind of Labor, Land, or Capital		Amount of All Other Factors Combined		Product
VIII. If	X	with	Y	will produce.........	P,
IX. then	aX	with	Y	will produce more than P, but less than	aP,
X. and	X	with	aY	will produce more than P, but less than	aP.

An industrial establishment is a combination of various factors under one management, and the question of large or small scale production becomes, therefore, a question of the proportion between the factor called management, on the one hand, and all the other factors, on the other. Formula III, which was given as an expression for the law of increasing or decreasing economy of large-scale production, may be modified as shown on page 718.

From this it will appear that the law of the increasing or decreasing economy of large-scale production, while sufficiently distinct from

that of increasing or diminishing returns to warrant a difference of name, is yet fundamentally very much like it.

	Manage-ment		Land		Labor		Capital		Product	
If	M	with	X	with	Y	with	Z	will produce	P,	
then	M	with	aX	with	aY	with	aZ	will produce	more than aP	(Increasing economy of large-scale production.)
									less than aP	(Decreasing economy of large-scale production.)

4. FACTORS COUNTERACTING DIMINISHING RETURNS IN AGRICULTURE[3]

There is another agency, in habitual antagonism to the law of diminishing return from land; and to the consideration of this we shall now proceed. It is no other than the progress of civilization. I use this general and somewhat vague expression, because the things to be included are so various, that hardly any term of a more restricted signification would comprehend them all.

Of these, the most obvious is the progress of agricultural knowledge, skill, and invention. Improved processes of agriculture are of two kinds: some enable the land to yield a greater absolute produce, without an equivalent increase of labor; others have not the power of increasing the produce, but have that of diminishing the labor and expense by which it is obtained. Among the first are to be reckoned the disuse of fallows, by means of the rotation of crops; and the introduction of new articles of cultivation capable of entering advantageously into the rotation. The change made in British agriculture toward the close of the [eighteenth] century, by the introduction of turnip husbandry, is spoken of as amounting to a revolution. These improvements operate not only by enabling the land to produce a crop every year instead of remaining idle one year in every two or three to renovate its powers, but also by direct increase of its productiveness; since the great addition made to the number of cattle by

[3] From John Stuart Mill, *Principles of Political Economy*, Book I, chap. xii.

the increase of their food affords more abundant manure to fertilize the corn lands. Next in order comes the introduction of new articles of food containing a greater amount of sustenance, like the potato, or more productive species or varieties of the same plant, such as the Swedish turnip. In the same class of improvements must be placed a better knowledge of the properties of manures, and of the most effectual modes of applying them; the introduction of new and more powerful fertilizing agents, such as guano, and the conversion to the same purpose, of substances previously wasted; inventions like subsoil-ploughing or tile-draining; improvements in the breed or feeding of laboring cattle; augmented stock of the animals which consume and convert into human food what would otherwise be wasted; and the like. The other sort of improvements, those which diminish labor, but without increasing the capacity of the land to produce, are such as the improved construction of tools; the introduction of new instruments which spare manual labor, as the winnowing and threshing machines; a more skilled and economical application of muscular exertion, such as the introduction, so slowly accomplished in England, of Scotch ploughing, with two horses abreast and one man, instead of three or four horses in a team and two men, etc. These improvements do not add to the productiveness of the land, but they are equally calculated with the former to counteract the tendency in the cost of production of agricultural produce, to rise with the progress of population and demand.

Analogous in effect to this second class of agricultural improvements, are improved means of communication. Good roads are equivalent to good tools. It is of no consequence whether the economy of labor takes place in extracting the produce from the soil, or in conveying it to the place where it is to be consumed. Not to say in addition, that the labor of cultivation itself is diminished by whatever lessens the cost of bringing manure from a distance, or facilitates the many operations of transport from place to place which occur within the bounds of the farm. Railways and canals are virtually a diminution of the cost of production of all things sent to market by them; and literally so of all those, the appliances and aids for producing which, they serve to transmit. By their means land can be cultivated which

would not otherwise have remunerated the cultivators without a rise of price. Improvements in navigation have, with respect to food or materials brought from beyond sea, a corresponding effect.

From similar considerations, it appears that many purely mechanical improvements, which have, apparently at least, no peculiar connection with agriculture, nevertheless enable a given amount of food to be obtained with a smaller expenditure of labor. A great improvement in the process of melting iron, would tend to cheapen agricultural implements, diminish the cost of railroads, of wagons and carts, ships, and perhaps buildings, and many other things to which iron is not at present applied, because it is too costly; and would thence diminish the cost of production of food. The same effect would follow from an improvement in those processes of what may be termed manufacture, to which the material of food is subjected after it is separated from the ground. The first application of wind or water power to grind corn, tended to cheapen bread as much as a very important discovery in agriculture would have done; and any great improvement in the construction of corn-mills would have, in proportion, a similar influence. The effects of cheapening locomotion have been already considered. There are also engineering inventions which facilitate all great operations on the earth's surface. An improvement in the art of taking levels is of importance to draining, not to mention canal and railway making. The fens of Holland, and of some parts of England, are drained by pumps worked by the wind or by steam. Where canals or irrigation, or where tanks or embankments are necessary, mechanical skill is a great resource for cheapening production.

There is, thus, no possible improvement in the arts of production which does not in one or another mode exercise an antagonistic influence to the law of diminishing return to agricultural labor. Nor is it only industrial improvements which have this effect. Improvements in government, and almost every kind of moral and social advancement, operate in the same manner. Suppose a country in the condition of France before the Revolution: taxation imposed almost exclusively on the industrious classes, and on such a principle as to be an actual penalty on production; and no redress obtainable for any injury to property or person, when inflicted by people of rank or court in-

fluence. Was not the hurricane which swept away this system of things, even if we look no further than to its effect in augmenting the productiveness of labor, equivalent to many industrial inventions? The removal of a fiscal burthen on agriculture, such as tithe, has the same effect as if the labor necessary for obtaining the existing produce were suddenly reduced one-tenth. The abolition of corn laws, or of any other restrictions which prevent commodities from being produced where the cost of their production is lowest, amounts to a vast improvement in production. When fertile land, previously reserved as hunting ground, or for any other purpose of amusement, is set free for culture, the aggregate productiveness of agricultural industry is increased.

We may say the same of improvement in education. The intelligence of the workman is a most important element in the productiveness of labor. So low, in some of the most civilized countries, is the present standard of intelligence, that there is hardly any source from which a more indefinite amount of improvement may be looked for in productive power, than by endowing with brains those who now have only hands. The carefulness, economy, and general trustworthiness of laborers are as important as their intelligence. Friendly relations, and a community of interest and feeling between laborers and employers, are eminently so: I should rather say, would be; for I know not where any such sentiment of friendly alliance now exists. Nor is it only in the laboring class that improvement of mind and character operates with beneficial effect even on industry. In the rich and idle classes, increased mental energy, more solid instruction, and stronger feelings of conscience, public spirit, or philanthropy, would qualify them to originate and promote the most valuable improvements, both in the economical resources of their country, and in its institutions and customs.

B. Management and Costs

Difficult as are the merely technological aspects of effective proportionality, this difficulty is vastly increased by the fact that this technological situation must be translated into price. Our producing activities are conducted under a régime of individual initiative and in the hope of securing gain. Management must be guided by technological considerations of proportionality, it is true, but such considera-

tions must ultimately be measured in cost terms. The *economics* of technology will at the last analysis tend to rule. The dominance of economic considerations means that the manager of every business is at the last analysis concerned with the balance between income and outgo. The income of the typical business, whether a law firm, a theater, a bank, a mine, a manufacturing establishment, or something else, comes from the sale of its commodities or services; and its manager is accordingly much interested in the character of the demand for the product. The outgo is mainly a matter of costs, and accordingly he is interested in the classes of his costs and in the behavior of the various types of cost.

While the industrial manager is directly concerned with the demand for his *particular* output, he is indirectly concerned with the character of the *total* market demand for the product which he and others are producing. A more complete analysis of market demand will be made in Part III in our study of the market and of value. Our present purposes will be served if we simply become aware of the fact that there are various types of demand, and, in particular, if we become reasonably clear with respect to the content of the expressions "elastic demand" and "inelastic demand." These two terms are relative, not absolute. If the number of units of a good which the market will absorb should vary considerably if relatively slight variations in price were to occur, this is said to be a case of elastic demand. If the number of units which the market will absorb should vary but slightly if relatively large variations in price were to occur, this is said to be a case of inelastic demand.

A word of caution is important. These concepts reflect the situation at a given instant of time; they do not deal, and do not purport to deal, with the situation over long periods of time.

The manager's policy in relation to his costs is in part dependent upon the demand for his output. If the number of units of his output which will be taken by the market can be readily increased, he is confronted with one type of situation as regards his production policy; if the number which will be taken cannot readily be increased, he is confronted by quite another type of situation.

As regards costs, every business man knows that costs are incurred in starting a business, but not every business man appreciates

the full extent of those costs. Yet these initial costs must be accurately estimated if the appropriate amount of capital funds is to be assembled. After a business is under way these initial costs result in annual claims upon the business: sometimes in the form of "writing off" an initial cost out of income; sometimes in the form of "contingent claims" (contingent upon there being net earnings) by the owners who have put in the basic capital fund; sometimes in the form of interest on borrowed funds.

And in a going concern there are costs. The terminology used in this connection, while rather extensive, is not fundamentally difficult Much of it may be made familiar territory by examining a few samples of that form of record known as a profit-and-loss statement of a business.

When costs are examined from the point of view of their behavior a more difficult problem is confronted. Our purposes will be served by a working understanding of such terms as joint cost, constant cost, increasing cost, and diminishing cost.

Two (or more) commodities have joint cost when the production of one involves as a practical matter the production of the other. The cost of producing mutton and sheep hides would be a case in point.

There is constant cost if an increase in output could be accomplished with stationary per-unit cost (the total cost would naturally increase). Although a theoretically possible situation, this state of affairs probably is not frequent in practical life. There is increasing cost if an increase in output would be attended by an increasing per unit cost. There is diminishing cost if an increase in output would be attended by a diminishing per unit cost (although presumably at an increased total cost). As regards all three of these types of costs, it should be kept in mind that the concepts refer to the situation at a given instant of time. Long run considerations or long periods of time are not contemplated in these concepts.

In all our discussion of the behavior of costs we should remember that we are trying to visualize the task of the manager in controlling his costs. He tries as best he can to analyze and to understand his costs; he tries to keep individual items of cost low; he continually considers the substitution of one process or material or factor for an-

other—the test of a successful substitution being the outcome upon his costs and upon the demand for his product.

It will be helpful to keep these issues[3a] in mind while reading the following selections:

1. Why or wherein is it of importance to a manager whether the demand for his commodity is elastic or inelastic?
2. Why or wherein is it of importance to a manager whether his cost situation is one of decreasing or one of increasing cost. What are typical cases of decreasing cost?
3. What (*a*) social issues and (*b*) managerial issues are raised by the presence of heavy overhead costs in industry?
4. What conditions in modern industry make it exceedingly difficult for managers (*a*) to know their costs and (*b*) to control them?

1. THE ELASTICITY OF DEMAND[4]

The only universal law as to a person's desire for a commodity is that it diminishes, other things being equal, with every increase in his supply of that commodity. But this diminution may be slow or rapid. If it is slow, the price that he will give for the commodity will not fall much in consequence of a considerable increase in his supply of it; and a small fall in price will cause a comparatively large increase in his purchases. But if it is rapid, a small fall in price will cause only a very small increase in his purchases. In the former case his willingness to purchase the thing stretches itself out a great deal under the action of a small inducement; the elasticity of his wants, we may say, is great. In the latter case the extra inducement given by the fall in price causes hardly any extension of his desire to purchase: the elasticity of his demand is small. If a fall in price from say fifty cents to forty cents per pound of tea would much increase his purchases, then a rise in price from forty cents to fifty cents would much diminish them. That is, when the demand is elastic for a fall in price, it is elastic also for a rise.

And as with the demand of one person so with that of a whole

[3a] A more detailed statement of issues may be found in *Outlines of the Economic Order*, pp. 159–73. (The University of Chicago Press.)

[4] Adapted from Alfred Marshall, *Principles of Economics* (1910), pp. 102–9. Reprinted by permission of the Macmillan Company, publishers.

market. And we may say generally:—*The elasticity of demand* in a market is great or small according as the amount demanded increases much or little for a given fall in price, and diminishes much or little for a given rise in price.

When the price of a thing is very high relatively to any class, they will buy but little of it; and in some cases custom and habit may prevent them from using it freely even after its price has fallen a good deal. It may still remain set apart for a limited number of special occasions, or for use in extreme illness, etc. But such cases, though not infrequent, do not form the general rule; and anyhow as soon as it has been taken into common use, any considerable fall in its price causes a great increase in the demand for it. The elasticity of demand is great for high prices, and great, or at least considerable, for medium prices, but it declines as the price falls; and gradually fades away if the fall goes so far that satiety level is reached.

This rule appears to hold with regard to nearly all commodities and with regard to the demand of every class; save only that the level at which high prices and low prices begin, is different for different classes; and so again is the level at which low prices end and very low prices begin. There are however many varieties in detail; arising chiefly from the fact that there are some commodities with which people are easily satiated, and others—chiefly things used for display—for which their desire is almost unlimited. For the latter the elasticity of demand remains considerable, however low the price may fall, while for the former the demand loses nearly all its elasticity as soon as a low price has once been reached.

There are some things the current prices of which in this country are very low relatively even to the poorer classes; such are for instance salt, and many kinds of savours and flavours, and also cheap medicines. It is doubtful whether any fall in price would induce a considerable increase in the consumption of these.

The current prices of meat, milk and butter, wool, tobacco, imported fruits, and of ordinary medical attendance, are such that every variation in price makes a great change in the consumption of them by the working classes and the lower half of the middle classes; but the rich would not much increase their own personal consumption of

them however cheaply they were to be had. In other words, the direct demand for these commodities is very elastic on the part of the working and lower middle classes, though not on the part of the rich. But the working class is so numerous that their consumption of such things as are well within their reach is much greater than that of the rich; and therefore the aggregate demand for all things of the kind is very elastic.

The case of necessaries is exceptional. When the price of wheat is very high, and again when it is very low, the demand has very little elasticity: at all events if we assume that wheat, even when scarce, is the cheapest food for man; and that, even when most plentiful, it is not consumed in any other way.

Water is one of the few things the consumption of which we are able to observe at all prices, from the very highest down to nothing at all. At moderate price the demand for it is very elastic. But the uses to which it can be put are capable of being completely filled: and as its price sinks towards zero the demand for it loses its elasticity. Nearly the same may be said of salt. Its price in England is so low that the demand for it as an article of food is very inelastic; but in India the price is comparatively high and the demand is comparatively elastic.

The price of house-room has never fallen very low except when a locality is being deserted by its inhabitants. Where the condition of society is healthy, and there is no check to general prosperity, there seems always to be an elastic demand for house-room, on account both of the real conveniences and the social distinction which it affords. The desire for those kinds of clothing which are not used for the purpose of display, is satiable: when their price is low the demand for them has scarcely any elasticity.

Generally speaking those things have the most elastic demand, which are capable of being applied to many different uses. Water for instance is needed first as food, then for cooking, then for washing of various kinds and so on. When there is no special drought, but water is sold by the pailful, the price may be low enough to enable even the poorer classes to drink as much of it as they are inclined while for cooking they sometimes use the same water twice over, and they ap-

ply it very scantily in washing. The middle classes will perhaps not use any of it twice for cooking; but they will make a pail of water go a good deal further for washing purposes than if they had an unlimited supply at command. When water is supplied by pipes and charged at a very low rate by meter, many people use as much of it even for washing as they feel at all inclined to do; and when the water is supplied not by meter but at a fixed annual charge, and is laid on in every place where it is wanted, the use of it for every purpose is carried to the full satiety limit.

On the other hand, demand is, generally speaking, very inelastic, firstly, for absolute necessaries (as distinguished from conventional necessaries and necessaries for efficiency); and secondly for some of those luxuries of the rich which do not absorb much of their income.

2. GRAPHICAL PRESENTATION OF ELASTICITY OF DEMAND[5]

In diagram I, DD^1 illustrates *absolute* elasticity of demand; i.e., an infinitely small variation in price would cause an infinitely great variation in amount purchased. At any price higher than OD there is no demand at all. At OD an infinite amount would be taken. *The*

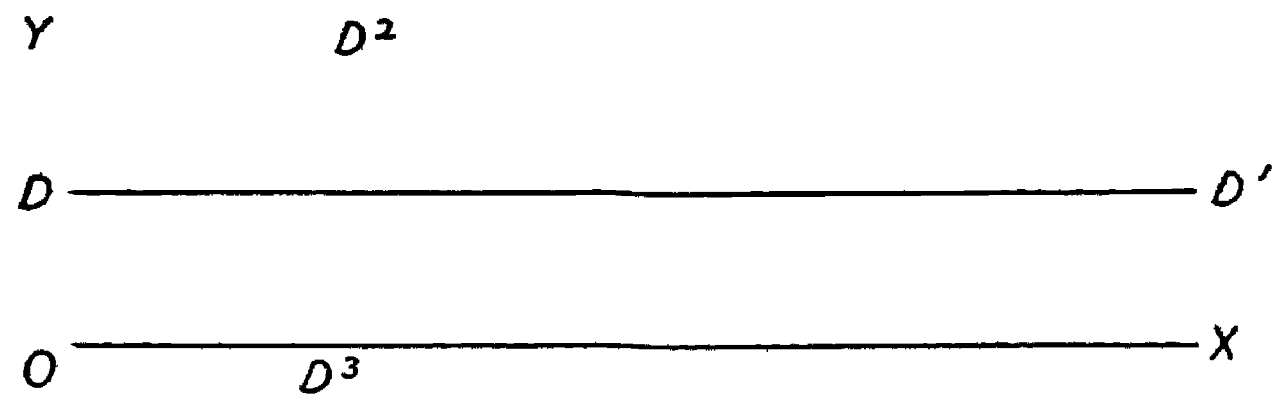


DIAGRAM I

concept of absolute elasticity obviously represents no situation which can conceivably exist. D^2 D^3 illustrates absolute inelasticity, i.e., the same amount, OD^3, would be purchased whatever the price. *While no actual demand schedule can be conceived as capable of actual realization which is absolutely inelastic throughout,* there are unquestionably many demand schedules which are completely, or almost completely, inelastic within a partial range of prices. Thus the amount of salt (or of bread) purchased by wealthy people would not increase or

[5] Anonymous.

would increase only very slightly if the price of salt (or of bread) fell 50 per cent from its present level.

Between the extremes of absolute elasticity and absolute inelasticity there are any number of degrees of relative elasticity.

In the second diagram, DD^1 is more elastic than DD^2. A fall in price from OA to OB would increase the amount purchased by CE if DD^1 were the demand curve, by FH if DD^2 were the demand curve. Conversely, a rise in price from OB to OA would reduce the amount purchased by CE, if DD^1 were the demand curve, by FH if DD^2 were the demand curve. A given change in prices causes a greater varia-

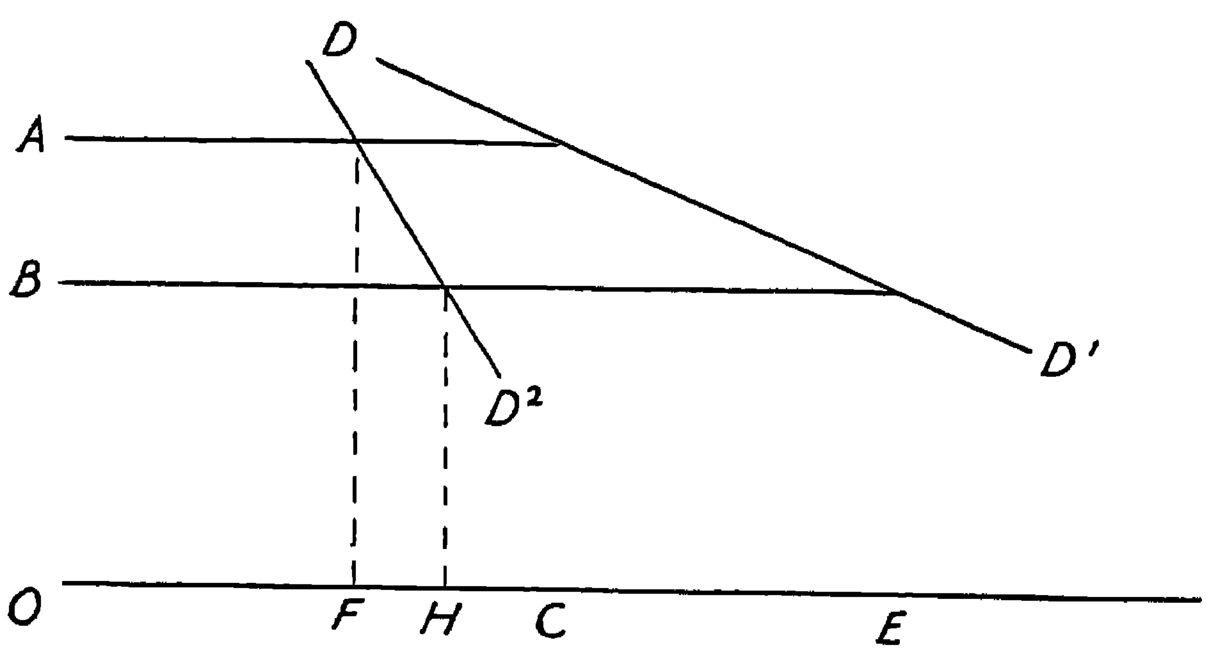


DIAGRAM II

tion in amount taken if DD^1 is the demand curve than if DD^2 is the demand curve. In other words, DD^1 is more elastic than DD^2.

An increase in supply will be followed by a greater drop in price if demand is inelastic than if demand is elastic, and conversely a decrease in supply will be followed by a greater rise in price if demand is inelastic than if demand is elastic. It takes a great change in price to induce a substantial change in amount of sales in either direction if demand is inelastic; if demand is elastic a small reduction in price will clear the market of an increase in supply, and a substantial decrease in supply will cause only a small rise in price. Price tends to fluctuate more, therefore, with changes in supply when demand is inelastic than when demand is elastic.

In the third diagram a fixed supply, OA, changes to a fixed sup-

ply, *OB*. If the demand curve is DD^1 (elastic), price falls from *OC* to *OE*. If the demand curve is DD^2 (inelastic), price falls from *OF* to *OG*, a much greater reduction.

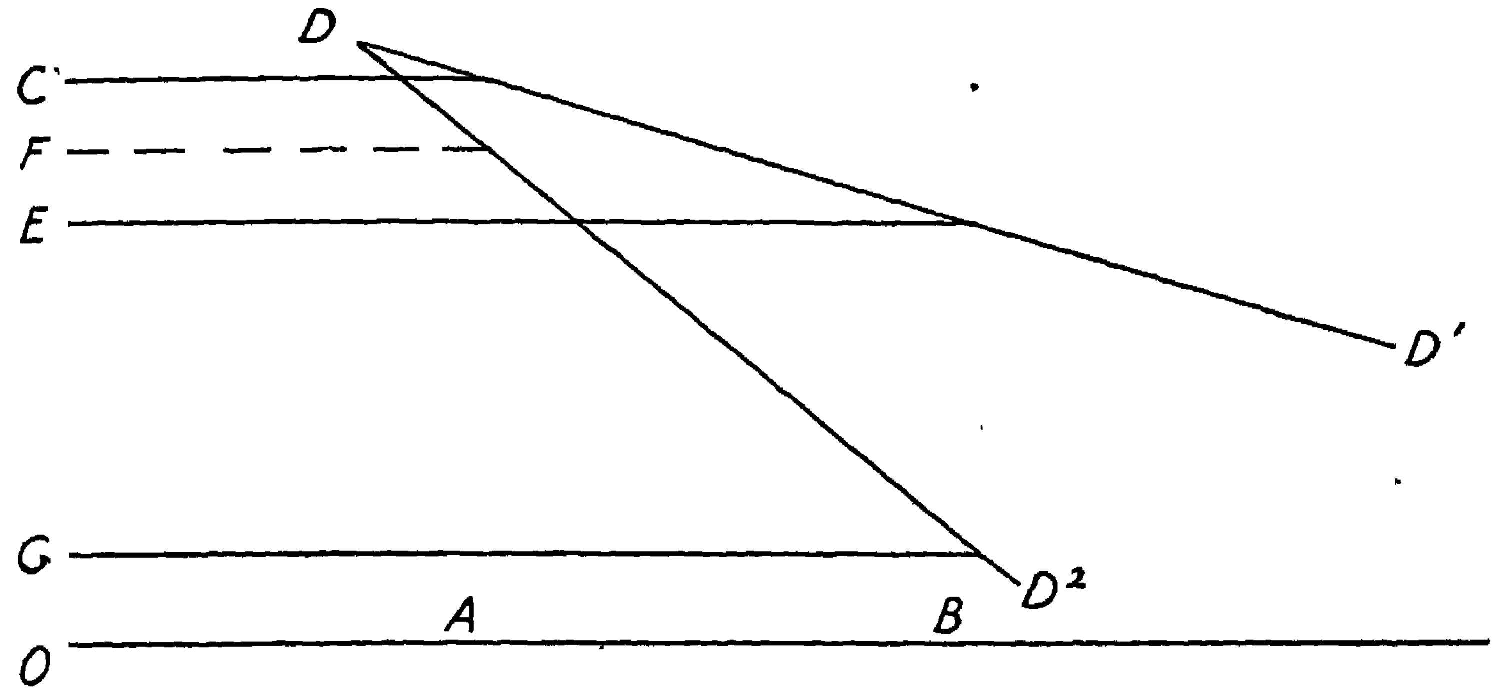


DIAGRAM III

3. COSTS INVOLVED IN STARTING A BUSINESS[6]

[The following selection has specific reference to the steps involved in starting a (corporate) gas plant business. It should be read, however, with the mind searching for the application of each point to other types of business. Most of the matters mentioned apply to the case of an individual proprietorship or a partnership as truly as they do to a corporation. And they are, in essence, by no means peculiar to the gas business.]

The cost of a gas plant and of acquiring its business may be subdivided as follows:

1. Preliminary development, which includes:
   a) Investigation of the project
   b) Assembling of parties who may be willing to participate
   c) Preliminary engineering and legal advice on the proposition
   d) Canvass of territory to ascertain if sufficient business can be obtained
   e) Estimate of cost of plant and probable income
   f) Incorporation of the company; and
   g) Securing the franchise
2. Real estate
3. Labor, materials, and sub-contracts
4. General contractor's profit

[6] Adapted by permission from C. W. Gerstenberg, *Materials of Corporation Finance*, pp. 455–56. (Prentice-Hall, 1915.)

5. Engineering
6. Expense of company organization during construction
7. Interest during construction
8. Taxes and insurance during construction
9. Stores, supplies, and working capital
10. Acquiring or establishing the business, which includes:
    a) Expenses of canvassing for business
    b) Advertising
    c) Setting meters free of charge.
    d) Interest on cost of plant in excess of income until business becomes self-supporting; and
    e) Taxes and insurance during that time
11. Legal expenses
12. Financing, including banker's commission, discount on bonds, and promoter's profits

Many of these items are overlooked by those who have had no experience in the actual establishment of such a business and that, no doubt, is the reason why the cost of such a plant and establishing such a business almost always largely exceeds the anticipated outlay.

4. ITEMS ENTERING INTO COST

A. THE VARIABILITY OF COSTS[7]

Let us consider, if you please, the cost of production from the manufacturers' standpoint. What is it and what does it involve and how shall it be handled? There are four groups that enter into every factory cost: (1) the cost of labor; (2) the cost of material; (3) burden cost (or overhead charges); (4) selling cost. The aggregate of these four fixes the point per unit of product where profit begins.

First, labor cost. In a modern industry this is often not the largest element in cost per unit of their product. In some industries it is rarely the largest element in unit cost. I am told that in an American locomotive the percentage of labor cost is 20 and that the percentage of material cost and of burden and overhead charges is 80.

It needs only the statement to show that the important factor in labor cost is not the rate of wage, but the rate of output. It is not what you pay, but what you get for what you pay that counts.

[7] Adapted from a speech by William C. Redfield in the House of Representatives, June 12, 1911. *Congressional Record,* 62d Congress, 1st session, Vol. XLVII, Part II, pp. 1941–45.

One of the things I should like to burn into your thought is this—the essentially variable quality of cost. It can not be talked about as a fixed thing. Cost is everywhere and always variable, at every time and in every place.

Labor cost per unit varies with time and place, and in the same shop is constantly changing. It is unlike in each of several mills producing the same goods, belonging to the same company.

Labor cost is affected by sanitary and climatic conditions. It varies with the quantity and the quality of the output, and it can never be assumed that it is at the close of the year what it was at the beginning of the year in the same shop. It is enormously modified by the progress of invention. The labor cost in your shop in January may be in some respects entirely wiped out by July. The labor cost in July may be entirely altered by December; else what is your purchasing agent for, and for what purpose are you feeling out all over the world for the latest machinery?

Labor cost varies with the arrangement of machinery within the shop. It is affected by the space available. It varies with changes in material, with the sufficiency and the regularity of the supply of material and its suitability to the work. And the labor cost of Monday when the stock runs out Monday afternoon and new stock comes in Tuesday is not the same on Tuesday that it was on Monday. The steel mill may have made an error and your labor cost go flying up for the time. And I am speaking now, gentlemen, from an experience in figuring labor costs to hundredths of a cent per unit.

Labor cost is affected by the lighting and the power equipment of the shop, and will change with the going of one superintendent and the coming of another. I am sure I need only to say these things one after the other to have their entire reasonableness made plain to you all.

Labor cost will alter radically within a month, by the introduction of new tools, new machinery, or the change of a process, even to the extent of having a whole process eliminated. It varies with the wastefulness of material used in producing an article, excessive use of supplies, the loss of time and material occasioned in making defective goods; and every one of these items has to be carefully watched by any alert manufacturer.

The labor cost is affected by methods of paying (by piecework on a righteous basis, and by day's work on an unrighteous basis) and by a just and considerate application of the methods of paying apart from the amount paid.

Labor cost is, therefore, a variable element. It cannot be measured by any fixed standard.

But labor cost in any factory is both direct and indirect, as will be made plain; upon the proper adjustment of one to the other depends in a degree the labor cost.

What is true of labor cost is true of other elements of cost. All are variable. But labor cost must serve to illustrate them all.

B. DIRECT AND INDIRECT COSTS[8]

Production costs are classified into three principal divisions, known as the elements of costs: (1) material; (2) labor; (3) expense. These may be subdivided into:

(1) Material { Indirect / Direct

(2) Labor { Direct or productive / Indirect or non-productive

(3) Expense { Direct / Indirect

Direct charges.—"Direct charges" is that element of cost that enters into, and can be charged directly to, the product.

The cost of the substance out of which the product is made is the direct material charge; the cost of the labor applied directly to the productive process is the direct labor charge; and any other expense that can be charged directly to an order, job, or process may be included as a direct charge under the caption "direct expense." The expense of workmen in traveling to and from a job, as well as their hotel expenses while engaged out of town on a particular job, are examples of direct expenses.

Indirect charges.—Indirect material consists of such material as factory supplies, which, while used in processes, either does not enter

[8] Adapted by permission from J. L. Nicholson, *Cost Accounting*, pp. 24–32. (The Ronald Press Co., 1913.)

into the product itself, or else enters in such a way as not to be chargeable conveniently to any particular article.

Indirect or non-productive labor is that used in repairing, handling, supervision, etc.—in short, any labor not expended directly on the article or process itself.

Indirect expense as used here refers only to those expenses incurred in the manufacturing end of the business which are properly a part of the cost of production; e.g., supervision, repairs, light, power, depreciation, etc.

Items composing the indirect charges.—The following list shows some of the more constant items which compose the indirect charges. The classification will vary in almost every factory, but the items listed almost invariably appear.

Indirect material	Insurance
Oil	Interest
Supplies	Depreciation
Freight and express inward, when not charges to direct material cost	Maintenance
	Repairs
Indirect labor	Power or power plant
Supervision	Light
Inspection	Heat
Experimental work	Small tools
Rent	Wastes of material, shrinkage of weight, defective work
Taxes	

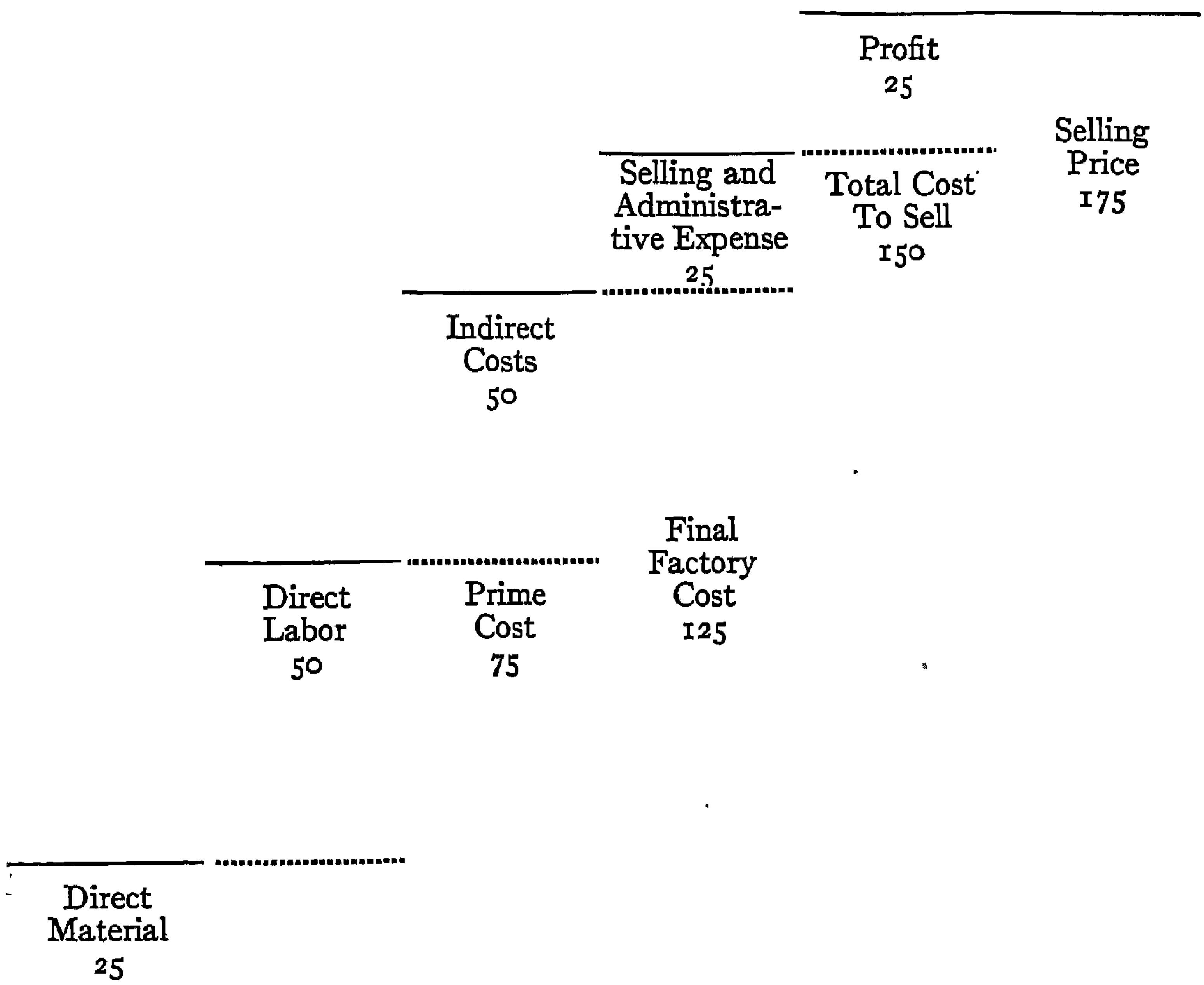
Production costs and selling costs.—A clear distinction must be made between production costs and selling costs. The latter include the selling expenses, such as advertising, commissions, salaries, etc., which are necessary elements in determining the price for which an article may sell, but have no direct bearing on the cost of producing the article itself. The cost of production ends when the finished stock is ready for sale.

The expenses that arise from advertising, commissions, salaries of officers, etc., are known as commercial or selling and administrative expenses.

The segregation of administrative expenses, as a distinct class, is sometimes a matter of convenience. In the majority of cases the time of the administrative force is spent in supervising the selling organization, in solving problems of production, and in looking after the

finances of the business. Therefore, administrative expense is partly a production cost, and partly a selling cost. The purposes of cost-finding are best served by separating expenses of such a nature from those expenses which arise from production proper and its direct supervision.

Relation of cost elements to selling price.—The sum of the direct material and labor cost is known as the "prime cost." This, combined with the indirect costs, gives the final "factory cost." The total of the selling and administrative expenses, plus the factory cost, shows the cost of making and marketing the article; and this total—plus the profit—gives the actual selling price.



This relation of the different elements may be illustrated by the diagram shown above, which, in the light of what has been said, is self-explanatory.

See also "The Balance Sheet, the Profit and Loss Statement, and the Budget," page 780.

5. THE IMPORTANCE OF ADDED BUSINESS IN INDUSTRIES OF HEAVY OVERHEAD COSTS

A. AN ARITHMETICAL ILLUSTRATION[9]

[NOTE.—In the railroad industry indirect costs are a very large part of the total costs. One writer estimates that the following statement of the case is fairly typical. The "fixed charges" are of course all indirect costs. The different parts of "operating expenses" are made up of direct and indirect costs in varying proportions, as shown in the table. The figures of Column III, showing the percentage of total expenses chargeable to each specified class of expenditures, are

	I	II	III
	Percentage of Costs Independent of Volume of Traffic	Percentage of Costs Dependent on Volume of Traffic	Total
Fixed charges	25	0	25
General operating expenses	3	0	3
Maintenance of way and structures	10	6	16
Maintenance of equipment	7	7	14
Conducting transportation	14	28	42
Total operating expenses	34	41	75
Total	59	41	100

divided in such a way as to indicate how much in each instance must be paid out regardless of the volume of traffic (Column I) and how much bears a relation to the volume of traffic (Column II). Dividend payments are not considered in this table.

The selection taken from Wellington does not make use of precisely the foregoing figures, but it is founded on the same general considerations and shows why it is, in such businesses, that seemingly trifling changes in prices or in volume of business make very great changes in the rate of profit.]

We will assume the case of a fairly prosperous line of the second grade whose income and outgo we shall find distributed in something

[9] Taken by permission from A. M. Wellington, *The Economic Theory of Railway Location*, pp. 111–12. (John Wiley & Sons, Inc., 1891.)

like the following manner: (The second column shows the effect of a 10 per cent increase in gross revenue.)

	Per Cent	Per Cent
Gross revenue	100.0	110.0
Operating expenses, unaffected by either alignment or volume of traffic (50 per cent of operating expenses)	33.3	33.3
Operating expenses, increasing directly with considerable changes in alignment or volume of traffic, but not with trifling changes (40 per cent)	26.7	26.7
Operating expenses, increasing directly with the less important changes in alignment or traffic (10 per cent)	6.7	7.4
Total of nominal operating expenses	66.7	67.4
Add to the latter the rental or interest charge (6 per cent on $30,000 per mile, assumed cash cost of road and plant)	25.7	25.7
Total cash cost of producing the transportation sold	92.4	93.1
Surplus available for dividends, being the business profit resulting from operation	7.6	16.9

B. AN ILLUSTRATION FROM BUSINESS[10]

Edison told Mr. Edmonds a very interesting personal anecdote:

I was the first manufacturer in the United States to adopt the idea of dumping surplus goods upon the foreign market. Thirty years ago my balance sheet showed me that I was not making much money. My manufacturing plant was not running to its full capacity. I couldn't find a market for my products. Then I suggested that we undertake to run our plant on full capacity and sell the surplus products in foreign markets at less than the cost of production. Every one of my associates opposed me. I had my experts figure out how much it would add to the cost of operating the plant if we increased this production 25 per cent. The figures showed that we could increase the production 25 per cent at an increased cost of only about 2 per cent. On this basis I sent a man to Europe who sold lamps there at a price less than the cost of production in Europe. By doing this I was able to employ more labor to run my plant to full capacity, and this labor, of course, received high wages. American consumers were not injured in the slightest, and I was enabled to employ 25 per cent more men and get rid of surplus product by dumping it upon the foreign market.

[10] From the *Wall Street Journal*, December 20, 1911.

6. JOINT PRODUCTS AND BY-PRODUCTS COMPLICATE COST CALCULATIONS[11]

The varieties of final products which are being made from raw materials and which consumers purchase are being continually increased. If all industry were to be charted in terms of function lines, the lines leading from any raw material to the final products would be considerable in number and in diversity and continually increasing.

Joint products.—This situation, in which a comparatively small and relatively unchanging number of raw materials is used for a much greater and increasing number of final products, has made possible a type of combination which is here termed the manufacture of joint products. Joint products may be defined as different products made from the same material, provided that the divergence is not essential to the manufacture of either product. The first part of this definition indicates merely divergence—the fact that such a combination, by varying the processes used in treating the material, obtains different products. The manufacturer has, for example, produced pig iron in the blast furnace. If his concern takes that pig iron and by using one process in one establishment manufactures steel rails and another process in another establishment produces bolts and rivets, it is thereby producing joint products. In the second part of the definition lies the distinction between joint products and by-products. Both are instances of different products made from a single basic material. But, in the manufacture of joint products, the operator is able to discontinue his activity in either line without affecting his operations in the other, except indirectly. Conversely, it is not required or necessary that he manufacture both products, but it is merely a voluntary expansion on his part. In the case of by-products, however, the divergence is essential to the maintenance of activity; glue can not be made unless the slaughtering establishment continues operation.

By-products.—A by-product is a product made from the same basic material as the main product, but diverging from the production of the main product during a process in such a way that the suspension of the production of the main product will result in suspending the production of the by-product. The division of the basic mate-

[11] Adapted from Willard Thorp, *The Integration of Industrial Operation,* Census Monograph III, pp. 176–96. (Washington, D.C.: Government Printing Office, 1924.)

rial into that for the main product and that for the by-product is not optional with the manufacturer, but necessarily occurs. Sawdust inevitably results from sawing wood.

Confusion is apt to arise because of the occasional use of the term by-product in reference to all subsidiary or secondary products. One product of a firm being termed its main product, then sometimes all other products which it produces are called by-products. To such products the adjectives secondary or subsidiary are much better applied, since such products often have no functional relationship whatsoever.

The utilization of waste material was one of the earliest principles of scientific management propounded. The efficiency expert made it the subject of immediate inquiry, and the utilization of waste products has come to be one of the standard measures of economic efficiency. With the aid of modern chemistry it was soon discovered that few materials are actually waste materials, and various methods have been adopted by enterprising manufacturers to make use of this new source of revenue.

The utilization of by-products is, of course, based upon sound economic reasoning. Two products, which when produced separately might both result in a net loss, may, on the other hand, if produced together, or if both be utilized, result in a profit. In many cases it is purely a matter of some income versus none. The sawmill produces huge quantities of sawdust. If any income can be gained from this material so much the better. The presence of waste products of this sort is fairly obvious, but in many cases examination has shown that huge values in by-products have been escaping entirely unknown to the producer. In the case of coke ovens especially, vast values in by-products have been lost, with no attempt made until recently to conserve them.

By-products are usually produced in the same establishment as the main products. There are two main reasons for this condition. In the first place, the amount of material available for by-product manufacture is usually not sufficient to justify the operation of a separate plant to deal with it. Generally, a department within the larger concern is quite sufficient to deal with this subsidiary interest. In the second place, by-product activity is carried on most often in the main

plant because of transportation facility and cost. Often the by-product process must be carried on immediately and in the vicinity of the main product process. Particularly in the case of by-products made from furnace fumes, is this situation true. Also, the by-product material is apt to be bulky and of little intrinsic value, so that extensive transportation would offset the gains made by utilizing it.

7. "COSTS" AND "RETURNS"[12]

It is a general law of production that, in any combination of the factors of production, any increase in the quantity of a single one of the factors beyond a certain point without a corresponding increase in the other factors brings an increase in the product of the total combination but an increase not in proportion to the increase in the varied factor.

The law of diminishing returns is a physical law, a law of technology. It deals with the physical result of different applications of one or more factors in production to other factors. There result from this law, however, important consequences in the field of values.

Each entrepreneur or farmer, if efficient, will not stop employing additional units of any factor as soon as diminishing returns (in the physical sense) appear, unless the *money cost* to him of that factor is at that point equal to the addition to the total product (measured in money) which would result from its use. Dependent upon the relative costs of each of the factors at that time, there is for each entrepreneur at any given time a certain combination of the factors which will yield to him the greatest net money return. Until each of the factors has reached its quotum in this combination, added units of it will more than repay their cost.

If, as is usually the case, some of the factors of production have become fixed in a given plant or farm, this will have a bearing on the question of what is for that plant or farm the most profitable combination of factors. Until that combination is reached, additional units of output will be produced at diminishing cost. Beyond that point additional output will be produced at increasing cost.

In most enterprises, the entrepreneur is committed to certain

[12] Anonymous.

costs which will continue whether he produces or not, and which will not increase much with an increase in his output, unless he changes the scale of his enterprise. The farmer owns or rents for a long period a farm, including land, buildings, improvements, and durable working equipment. If he owns the farm, he must figure as a cost the return which this total investment would bring if loaned out or otherwise invested. If he rents the farm, he must pay each year a certain sum for its use which sum will correspond on the average—perhaps only approximately—to the annual value of the use of such a farm to the ordinary farmer. These costs represent the "fixed costs" in farming. The manufacturer has similar fixed costs, representing the normal return expected from the investment of his resources in land, buildings, durable equipment, and the development of a business organization and of "good-will" among the consumers of his product. The well-known fact that these "fixed costs" do not vary with the amount of output leads to the existence in every enterprise of a tendency toward decreasing unit costs as output increases.

It should be pointed out, however, that fixed costs are rarely absolutely fixed whatever the size of the output, and that the so-called variable or direct costs rarely have complete enough flexibility so that they can be immediately and completely adjusted to variations in the rate of output. The differences between the two classes of cost are differences of degree only. But for at least a large part of the range of business costs—all except those costs which are at the border line between the two classes—these differences of degree are great enough to justify, and for many purposes to necessitate, their treatment as if they were differences in kind.

The principles of decreasing costs and diminishing returns may be operating in the same plant at the same time. The former is a value or price concept, the latter a technological or "amount of product" concept. Given the size of a plant and therefore the amount of its fixed charges, every increase in the amount of labor and capital employed in connection with that plant will bring an increase in the total output of that plant, but an increase less than proportionate to the increase in the number of laborers and the amount of capital utilized; i.e., the law of diminishing returns is in operation. But if the

added units of labor and capital result in an addition to the output which is greater than the addition to total cost, the average cost per unit of the output decreases; i.e., there is decreasing cost with increased output.

This tendency to decreasing costs with increased output is usually due to the existence of fixed charges which do not increase with increased output and which are therefore less per unit when the output increases. Assume that the variations in the output of the plant do not appreciably influence the price on the market of its product, and assume that the money costs of labor and capital per unit of labor and capital do not rise as the amounts utilized increase. Nevertheless, because of the operation of the law of diminishing returns the direct costs per unit of output tend to increase as output increases. Additions to the number of laborers employed bring additions to the total output decreasing in amount with each successive increase in the number of laborers employed. Until the plant is being utilized to its capacity the decrease in the fixed costs per unit is in exactly inverse proportion to the increase per output, whereas the increase in direct costs is at a much slower rate. As output increases, however, the amount of reduction per unit in fixed costs decreases, whereas the average direct cost to be charged to the marginal unit increases. A point will be reached, generally not far from the maximum capacity of the plant, at which the decrease per unit in fixed costs will not be sufficient to offset the increase in direct costs. Up to this point there are decreasing costs with increased output; beyond this point there are increasing costs with increased output.

8. A BUSINESS CASE[13]

Little more than six months ago [this article appeared in July, 1921] Henry Ford had all but completed arrangements for borrowing $75,000,000, and in the face of what appeared desperate necessity. His plants were closed; there was little demand for his cars; he owed the Government $55,000,000 in taxes; notes for nearly $30,000,000 originally issued to buy out his minority partners were due within a few weeks; a bonus of $7,000,000 was due his employees; whereas cash and treasury bonds together aggregated only $33,000,000.

[13] Adapted by permission from the *Wall Street Journal*, Vol. LXXVIII, No. 10 (1921), pp. 1, 3, and Vol. LXXVIII, No. 18 (1921), p. 1.

Yet Ford did not borrow from banks. He paid them up and today his sales are the greatest in history. How was the corner turned? He has told his own story of the triple-faced wedge which he used to open the path that led his industries to a new prosperity. The three faces of this wedge were (1) the shipment of surplus cars, (2) ruthless economies, (3) transportation. The first thing which he did was to transfer the load. He had 125,000 surplus cars on his inventory and he pushed them off his inventory account into the hands of his 17,000 dealers. An Indiana dealer had his floor full of Fords. Imagine his consternation when a trainload rolled, unordered, into the city. His business future was at stake. He must and did accept the draft, but he could not pay for the cars. A former disgruntled Ford leader with superior resources bought the trainload at wholesale and startled the countryside by advertising a bargain sale of Fords. In other cities and towns the dealers went to their banks and borrowed on the cars. Shipments averaged about a tenth of a year's business and the credit was quickly obtainable. The cash flowed back into Detroit and by the middle of April Ford had not only paid up the current quarter's Federal taxes, but had anticipated payment on the remaining $26,000,000 of his purchase notes.

The unloading plan was a success because it was economically sound and ruthlessly applied. Agents were bluntly told they were indebted to the Ford company and that to prosper in the future they must assist now. Those who rebelled were removed. Those who accepted are today the strongest proponents of the Ford methods. At the end of April Ford's inventory had been reduced from $105,000,000 to $63,800,000. He had been manufacturing his inventory, including spare parts, into finished car shipments to dealers which went out with drafts attached. At the above date there was reported due him more than $40,000,000 representing finished cars, probably 80,000 of them, shipped out and accepted by dealers and carried on the company's books as an asset. This item increased $28,000,000 from the first of the year.

The second method which he used was that of economies in his business. He combed his entire organization. Where he formerly employed 60,000 men to produce an average of 4,000 cars daily he now

obtains an output of 4,500 daily with 45,000 men. The $6 minimum wage has been retained, but foremen have been put to work, tasks doubled up and adjustments averaging 20 to 25 per cent reduction made in wages. He did not confine his combing to his factories. He came East and found $91,000,000 in "frozen" cars and parts in New York, Philadelphia and Boston. Changes in personnel followed and others were threatened. The cars began to move out. Mr. Ford said:

> Office and factory came in for a housecleaning. Back in November, 1920, our daily expense for labor and commercial overhead charges, cost of material not included, averaged $463,200 to get out an average of 3,146 cars daily, or $146 a car. Now for $412,500 a day we produce an average of 4,392 cars daily, or $93 a car. Formerly fifteen men were employed per day per car. Now it requires only nine.
>
> We went through the offices and cut out a lot of jobs created during the war. We literally took out and sold a trainload of desks. We told the men that occupied these desks that back in the shops there were plenty of good jobs at good pay, if they wanted them. Most of them did. We cut the office forces from 1,074 persons to 528. Telephone extensions were cut about 60 per cent. Interesting but useless statistical systems were abolished.
>
> We went through the shops in the same way. During the war we had a foreman for about every three to five men. Too many foremen sat at desks looking on. We sold all the desks and put most of the former foremen working. We now have a foreman for about every twenty men. Everybody and everything not producing was put in a position where it could produce or was eliminated.

By April 1 conditions had so far improved that factories were again running full tilt. Here enters the previously unemphasized matter of transportation. He began to use his Detroit & Ironton for all inbound and outbound shipments possible, making connections with east and west lines at advantageous points along the road. Mr. Ford said:

> Before we got control of this road, it required an average of twenty-two days to haul raw material to the factories, make it into cars and get it to the dealers. The money tied up stood continually at about $88,000,000. Now that time has been cut to fourteen days. We will cut it still more. Where we had $88,000,000 tied up to make 93,000 cars a month we now make 114,000 cars a month with $60,000,000. This freed $28,000,000 for other purposes.

Since April a further remarkable spurt in Ford business has taken place. Cash the first of June was around $36,000,000 and there were

no outstanding obligations except current merchandise acceptances. The measure of sales since that time and now, is factory capacity and not merchandising efforts.

C. The Field of Enterprise and Management—Especially Management

We have seen that social institutions and social organization condition our economic activities; that certain forms of the business unit have emerged in the long process of working out effective ways of organizing social energy in a régime of individual initiative; that the scale of operations has become very great in many business units; and that modern conditions of production have resulted in an exceedingly complex situation as regards costs. We are now in a position to examine in some detail how the responsible managers of producing activities (manufacturing, financing, marketing, mining, recreating, etc.) administer the ranges of activities over which they have control in our individualistic competitive society. We shall proceed by observing the main types of activities in modern business as a background to a discussion of organization, and to a discussion of the aids which have been developed to facilitate the work of management. In this realm, as in so many of man's activities, the modern tendency is to turn to scientific methods instead of continuing to use rules-of-thumb.

It is the task of management or administration to control the operations of modern business. These operations, considered as mere details, are almost innumerable. When analyzed, however, they fall into a relatively small number of groups of activities, or functions. There are activities connected with (1) technology (mainly production problems), (2) personnel, (3) the market (including purchasing, selling, and traffic), (4) finance, (5) risk-bearing, and (6) public relations. These activities are highly interdependent. A problem arising in one field is likely to have its influence felt throughout most of the others, if not throughout all of them.

The manager who administers these groups of activities finds that the problems arising within each group not only reach out to the other groups but also reach out into the framework of society. We have already seen that the administration of personnel within a business is profoundly affected by the position of the worker in modern society and by the various social attitudes and institutions which have devel-

oped in connection with the worker. So also, the manager's administration of finance, or of the market, or of risk-bearing, or of public relations, or of technology, is, and must be, profoundly affected by the various types of institutional life that have developed in these fields. "Business statesmanship" requires not merely a well-rounded understanding of business, but also a firm grasp on the outstanding characteristics and institutions of the economic (indeed, the whole social) order.

The readings in this section have been selected for the light they throw on the following[14] issues:

1. What are the significant elements of the enterprise function in any society, and what are the significant devices or agencies used to perform these functions in our society?
2. What are the outstanding functional fields in management? Are they independent of each other or are they interdependent?
3. What are the outstanding or basic processes in management or administration—what basic activities must every responsible administrator perform?

1. THE ENTREPRENEUR FUNCTION AND ITS PERFORMANCE[14a]

If we assume a differentiated industrial society—a society based on modern machine technique and the extensive division of labour which characterizes it—we shall have made an assumption about the nature of the economic system which is independent of the manner in which property is owned or in which industrial administration is arranged.

It does not require much argument to show that in a society of this description some co-ordinating force would be necessary. The fact of the division of labour means that society is split into numerous producing groups. Each group specializes on one line of activity, and inside each are smaller groups of workers engaged on different and specialized parts. Each relies on exchange of its products with the products of other groups, and if it finds this exchange impossible it is

[14] A more detailed statement of issues may be found in *Outlines of the Economic Order*, pp. 174–77. (The University of Chicago Press.)

[14a] Adapted from M. Dobb, *Capitalist Enterprise and Social Progress*, pp. 26–59. (London: George Routledge & Sons, Ltd., 1925.)

forthwith deprived of a livelihood. Now, this process of exchange is not merely a matter of distributive machinery—of railways and lorries to transport the goods from place to place, of clerks and account-books to register the exchanges. The greatest possible advantage for all can only be obtained if this exchange is regulated in a certain way, and if, moreover, the activities of the various groups are themselves controlled and regulated according to a certain plan. In short, if the maximum economic welfare is to be obtained, capital equipment (and labour and materials and land as well) must be allocated to its various uses in such a way as to yield the *greatest net utility*.

So far a purely static condition of affairs has been assumed, and our analysis has been confined to a discovery of the kind of adjustment that is necessary to get the best results from any given set of static conditions. But there is also the dynamic aspect of the matter. For a society to increase its wealth, as distinct from securing the most out of its existing resources and organization, there must be a continual development, planning anew, and regrouping of activities so as to increase the yield of human effort. There will constantly occur certain changes which will necessitate an adaptation of economic organization to the changed conditions. Some wants will become satiated and decline; new wants will spring into being, or some existing wants increase. Old sources of raw materials will become exhausted, new sources will be discovered or become accessible. All changes of this kind will need a regrouping of resources, and only in so far as this rearrangement occurs quickly and smoothly will actual loss from the change be avoided.

In addition to adaptation there is the need for innovation—the need to pioneer such changes as will increase the yield of human effort. These will fall roughly into three classes: inventions in technique, geographical discoveries which affect conditions of supply and of transport, and inventions in organization. The work of the inventor or the discoverer in such changes is only the first step. If the change is to descend from the realm of theory to that of practice, the adoption and introduction of the invention or the actual exploitation of the discovery will have to be arranged. This is a quite distinct matter from the invention itself, and is by no means the simple matter which the words imply.

Any economic society, therefore, if it is to be progressive, will require two main functions, which the composite term *Entrepreneur Function* seems to describe most appropriately.

1. The need (*a*) so to preserve the balance between producing groups that, in general, the marginal utility of the supply covers its marginal cost; and (*b*) so to regulate the distribution of economic resources between alternative uses that the marginal yield in all uses is approximately equal.

2. The need to promote such changes in the conditions of supply and technique as to increase the yield of human effort as much as possible, the grouping of resources being speedily and appropriately adapted to such changes in conformity with (1*a*) and (1*b*).

Now, an essential condition for the fulfilment of this function is the ability continually to measure and to balance costs and utilities and the habit of so doing. Without measurement of costs and utilities there will be no basis for securing adjustment—there will be no plumb-line by which resources may be adapted to changing conditions. It is, therefore, as a condition of the operation of this function that we find the most significant rôle of money in an economic system.

This Entrepreneur Function, which any differentiated society will need, could conceivably be fulfilled in a variety of ways. Three alternative systems of enterprise will be outlined, and then one of them will be described in greater detail.

First, the Entrepreneur Function could be fulfilled by a large number of small independent producers (or groups of producers), connected by a number of independent middlemen who operated with fairly small capitals and were in free competition with one another. The regulation of production would in such a society take place automatically through the operation of price movements. Middlemen, who would govern their actions by the prices at which they expected to sell, would be the links in the chain connecting consumer with producer and each producer with his fellows. We find a system which is something of this type in certain sectors of the economic world of the Middle Ages. We also find it in the early stage of development of new countries, as in the Middle West of America during the pioneering days; and it usually exists where a population of small peasants predominates, grouped around a number of small rural towns.

Second, the Entrepreneur Function might be performed by agents of the community, who operated with communal resources on the community's behalf. Producing groups would be captained by persons responsible to some collective body, and these groups would be connected with one another and with the consumers by middlemen who acted as public servants.

It is difficult to attach to this form of society any specific disadvantages; for there are many different methods by which its administration could be conducted, and its success would largely depend on the success of these administrative arrangements and upon the reaction of the psychology of the people to them. But there are certain dangers to which it is quite definitely susceptible. (*a*) There is the danger that the administration may be influenced by other than economic considerations to the detriment of the principles of entrepreneur adjustment. (*b*) Owing to the insistence of present needs and the pressure of democracy, too little provision may be made for the future in the shape of development work and indirect production. (*c*) It might happen that the rate of economic change was slow, either because of the sloth and timidity of the administrators, or because insufficient authority had been delegated to the controlling economic body to enable it to take a bold policy in effecting a regrouping of resources for the improvement of the efficiency of industrial organization. Every such regrouping would, presumably, meet resistance to some extent in the conservative habits of those affected.

The third way in which the Entrepreneur Function can be performed is that which is illustrated by the present system. Under this system the control of economic operations is in the hands of capitalist undertakers, usually operating with their own capital, and forming, together with those associated with them, an employing class on a higher income level than the rest of the community. These business men fall roughly under three heads.

The first of the three main groups among undertakers, is the *industrial undertakers,* who captain a given range of productive operations. In a one-man business or small partnership they are not hard to distinguish; but in the big company it is more difficult to discern clearly where the main responsibility for policy lies. In the majority of the most important enterprises, however, they are usually a small

group among the directors or the largest shareholders or both; and these are clearly separate from their salaried managers, on the one hand, who execute their policy, and from the mass of shareholders, on the other hand, who have little real part in the guiding of the company's destinies.

Second, there are the *financial undertakers,* who control the distribution of capital into various uses. These are the promoters and finance houses, the trust and investment companies of various kinds, and, in addition, numerous independent financiers who operate on their own, often in groups, but do not necessarily specialize in any one sphere. In recent years the scope for the independent judgment of the small individual investor has been narrowed by the growth of investment companies; and the ease with which the public can at times be seriously misled by bad advice and by manipulations seems to suggest that the initiative of the general mass of investors, possessed of little expert knowledge, is in actual practice very small.

Third, there are the *commercial undertakers* who organize marketing operations, plan and control the distribution of finished goods to consumers, of raw materials to producers, or partially-produced goods to other producers; and in ordering stocks in advance and then selling them where best they can, they are running the risk that their anticipation of market prices may be disappointed. In the history of undertaking, enterprises of this type were of great importance; they were the bold pioneers of national greatness and of widened markets like the Merchant Adventurers and the Tudor trading companies, and one of these, the Hudson Bay Company, has continued its operations up to the present day. Since the eighteenth century, however, the importance of specialized merchant enterprise has declined relatively to industry and finance, and the concentration of industrial control has partially eliminated the independent middleman in some branches of business.

These three groups of undertakers have in the past been fairly rigidly separated, and their interests have often diverged and conflicted fundamentally. But during the last fifty years there has developed a considerable integration and overlapping between them.

2. GUIDANCE OF ENTREPRENEUR'S CHOICES[15]

[NOTE.—The following is an outline presentation of factors bearing upon the economic choices of the entrepreneur. In studying the outline, the student should work out illustrations of the propositions given.]

I. By the entrepreneur himself
  A. General considerations
    (1) Effect of entrepreneur's guidance best seen by comparison of personal entrepreneur, corporate entrepreneur, public manager, co-operative manager, and independent civic associations, throughout following treatment
    (2) How affected by range of alternatives open to him
      a) In general, alternatives open to entrepreneur represent a surplus over minimum needs, in contrast to those open to labor, which may represent a shortage
      b) After committing one's self to an enterprise, range of alternatives less favorable
      c) Most efficient policy for business as a whole may not be open to a single entrepreneur, e.g., best location for any one produce jobbing house is near the others, even if they are not in the best place for the trade as a whole. Intelligent individual decisions will not prevent perpetuation of location that has become uneconomical
      d) Individual may avoid costs which the community still has to bear (e.g., discharging a misfit workman versus finding a place where he will fit. Society must do the latter in any case, or suffer the greater loss of the workman's degeneration—a loss not confined to the workman himself)
    (3) Motives: entrepreneur not below the average in sympathy, group loyalty, morality. Above the average in emotional enthusiasm for work as such and readiness to assume positions of responsibility. Justification for regarding him as primarily governed by calculating self-interest chiefly due to situation in which he operates
  B. Calculation of prices, qualities, performances, costs, etc.
    (1) Entrepreneur has greater interest in accuracy than consumers and others, because his entire income may hinge on a narrow margin between expense and income of business, especially if competition is active

[15] Adapted by permission from J. M. Clark, "Economics and Modern Psychology," *Journal of Political Economy*, XXVI (1918), 152–60.

(2) He has resources, if his business is a large one, to make expensive studies. Disadvantage of small producer may be made good by co-operative action

(3) Limitations of cost-accounting: expense, impossibility of adapting one formula for apportionment of overhead items to varied requirements of shop policy, marketing policy, large versus small increments of business, short-time versus long-time increments, plant running part time versus plant running at full capacity, labor policy, etc. Need of business statistics, rather than mere accounting formulas, for apportioning general items of expense. Such work most economically done by an agency covering many plants and many industries. Peculiarly inadequate is knowledge of costs and values of employment departments, labor turnover, and labor policies in general

C. Finding the "best proportion of factors" (subject to limitations mentioned above)

(1) Process largely one of imitation and custom modified by trial and error, with competition weeding out the worst mistakes

(2) Imitation and custom strongest in small-scale industries, competition weakest with small local producers and very large-scale industries

(3) No hard and fast line between quantitative changes in proportion of factors and qualitative changes in methods, since to use labor and capital efficiently in unfamiliar proportions capital must be put into unfamiliar forms and labor trained to unfamiliar processes

D. Innovations

(1) Technical innovations

a) Results largely determinable by experiment

b) If the process cannot be used by all, its productive efficiency is limited

c) If the process must be granted freely to all, the originator has no reward and other possible originators no incentive

d) Patent system: Term of patent not proportional to life of commercial value of invention. High cost of protection against infringement may lead to unduly small reward. Ownership of many patents may deprive public of advantage of power to substitute second-best processes and so lead to unduly large reward. Collective research on salary basis as substitute. Difficulty of determining value of contribution. Failures contribute to knowledge on which ultimate successes are built

(2) Innovations in commercial and business organization

a) Private possession of resulting gains is partly secured through business reticence, and through the time and effort necessary to adapt one man's methods to another man's business. Secrecy

seems on the decrease (commercial associations promote frankness and realization of joint interest)

b) Experimenting more costly since not confined to laboratory or testing department. Hence collective research a peculiarly valuable method in this field. If every producer has to care for his own industrial researches, small producers are at a much greater disadvantage than if some collective system is used. Thus in critical cases the establishment of a good system of co-operative or public research may prevent the savings of large-scale production from going so far as to establish a "natural monopoly"

c) The gain or loss which improvements bring to society include many things which do not figure in the financial calculations of the business men who make the improvements. Technical revolutions make obsolete many business customs, legal doctrines, and other institutions. Labor contracts become complex because they must specify definitely many things which might otherwise be ignored with the understanding that they would be settled according to the custom of the trade. Laborers must delegate specialists to care for these increasingly complex contracts, and this is expensive; also they are forced to depend upon the honesty and loyalty of their specialist-agents, who are not always worthy of this trust. Modern manufacturing methods make it harder for the consumer to judge the quality of goods, and the qualities may change so imperceptibly, yet so quickly, that consumers' habits and customs of consumption cannot be relied on. The consumer needs expert help in this matter, including the services of scientific laboratories, and this is a heavy expense. Changed methods of production bring changes in the sanitary conditions of shops, and changes in the character of the fatigue and nervous wear and tear on the workman. These bring with them possibilities of damage to physical and mental health which the workman himself cannot foresee and provide against. In general, with the industrial change carried on by scientific specialists, laborers and consumers need other scientific specialists to help them protect their interests in the changed conditions created.

E. Judgment of efficiency of subordinates

(1) Value and limitations of formal tests

(2) Methods of informal judgment

F. The corporation as an economic man. If corporation is to act with calculating selfishness *as a corporation,* directors and officers must act with perfect loyalty *as persons* in the rôles assigned by their positions. In proportion as corporations dominate business, economics becomes the science, not of self-interest within the law, but of loyalty beyond what the penalties of law can enforce

(1) Development of codes of intra-corporate honesty
(2) Competition as a force in this direction weeding out the badly managed enterprises
(3) Types of business affording opportunities for profits through disloyalty
a) The very profitable. Will stand some looting without going bankrupt
b) The very unprofitable. The only chance for a big personal profit here is by looting the corporation while there is still something to loot

II. By other agencies under commercial incentives
A. Internal (see cost-accounting and innovation, above): routine records versus creative work. Information of value only to one entrepreneur versus information of value to trade as a whole—e.g., routine accounting. Though a form of guidance, its primary value is inalienably private, and private enterprise secures this service with reasonable adequacy. Contrast the devising of the best accounting system for small-scale industry; essentially a joint or public interest
B. Specialists in new services, business barometrics, technical and commercial periodicals. Value limited by reticence of business men from whom information must be obtained
C. Advertising and selling services: since the entrepreneur is able to take care of his own interests as purchaser, sellers are compelled to rely chiefly on verifiable information, hence less wasteful than selling to consumers. This less true of selling to small-scale producers.
D. Other ways of attracting customers
(1) Railroads' industrial departments
(2) Inducements offered by local bodies to attract industries to their town

III. Informal co-operation of entrepreneurs
A. Contact in trade and technical associations
B. Codes of fair dealing

IV. Formal co-operation of entrepreneurs
A. Exchanges with rules of trading, etc.
B. Grading of goods (also done under public control)
C. Information services of co-operative associations, agricultural especially
D. Co-operative buying, chiefly agricultural

V. Outside non-commercial agencies chiefly acting from civic motives
A. Economic and industrial research
B. Mediation in labor disputes
C. Educative effect of political propaganda in attracting attention to unprotected social interests

D. Education in general: its best service in this matter is to develop in business men and others a lively sense of the remote effects of business policies, and a bias toward treating these effects as they would if the people affected were acquaintances and the effects were visible and immediate

E. Public agencies
  (1) Fundamental legal institutions (forms of restraint rather than guidance of free choices)
  (2) Services of value to employers as a group and not adequately cared for by limited resources of single employers
    a) Experimental and publicity work in agriculture
    b) Testing done by Bureau of Standards
    c) Consular service and possible enlargements of such functions
    d) Improving conditions in which buyer and seller meet, e.g., public wholesale markets
  (3) Research in means of furthering interests which single employers do not have adequate financial incentive to protect
    a) Safety studies, e.g., Bureau of Mines
    b) Unemployment studies
    c) Studies in effects of adulterations
  (4) Work combining features of (2) and (3). Standardization of methods of dealing with labor, studies of causes and costs of labor turnover, etc.
  (5) Control of conditions of bargaining, of location of industries (e.g., city zoning and city planning), etc. Forms of restraint rather than guidance of free choices but made necessary by blind spots in entrepreneur guidance

---

See also:
"The Development of Individualism," page 231.
"The Entrepreneur and the Gain Spirit," page 369.
"Some Responsible Agents," page 372.
"The Promoter," page 374.

3. THE FIELDS OF ACTIVITY IN BUSINESS ADMINISTRATION

Summarily stated, the outstanding tasks of the executive are concerned with the following:

1. His relationship to the physical environment
2. His relationship to technology
3. His relationship to the market

4. His relationship to personnel
5. His relationship to finance
6. His relationship to risk and risk-bearing
7. His relationship to the social environment
8. His relationship to the coherent control of activities arising from the foregoing relationships.

1. With respect to his relationship to his physical environment little need be said. This relationship is always present but it is of course more obvious in the primary industries than in the secondary industries or in professional and personal services. In this relationship the manager comes into touch primarily with the problems of the earth sciences. He may or may not be an expert in these fields; the typical manager has only a general acquaintance with them. He relies upon the expert opinion of the geologist and the geographer. These experts are in some cases permanently attached to the business; in other cases they are merely called upon in connection with some specific task.

2. Quite commonly we hear modern industry called "technological" industry. One writer[16] states it a bit differently by reminding us that the economic activity of man has passed through three stages. There was first the appropriative period in which man "appropriated" commodities in their natural state. For example, he picked and ate berries or nuts. Later came the adaptive period which may be illustrated by the assembling of branches or stones to build a hut. He is today in the creative period in which science is the handmaiden of industry, and in which startling analyses and metamorphoses of commodities take place.

With the development of our society a rich institutional life has sprung up in connection with the technological aspects of industry. The clearest illustration of this may be seen in the development of our schools of technology. The Industrial Revolution, notwithstanding the great increase of productive power which it gave us, ushered in an era during which the expansion of the market occurred even more rapidly. The need of the times was a steadily increasing productive capacity and the response was, in part, our schools of technology

[16] Cf. Slosson, *Creative Chemistry.*

which applied the findings of science to agriculture, mechanics, mining, and other fields.

The modern executive must operate in terms of this situation. As has been indicated above, he must, at the very least, be intelligent with respect to the technological aspects and implications of his task.

3. Our whole industrial society is in a sense a market society. A loan at a bank, the hiring of a worker at a factory, the ordering of a meal at a restaurant, the issuance of stocks and bonds of a corporation, the lease or purchase of a piece of land, the payment of tuition at a university—indeed, the major part of the business happenings of our daily life—are either market transactions or closely allied thereto. In making this statement, however, the term "market" is used in its broadest inclusive sense. The executive thinks of it in a narrower sense. To him it is the institution and procedure through which he secures his equipment and raw materials and through which he disposes of his finished product.

Here, too, an interesting range of institutional life has developed—again partly in response to the needs of the executive. The wholesaler, the retailer, the jobber, the advertising agency, the mail-order house, the transportation system, are some of the more common forms. The modern business executive deals with his market problems in terms of this institutional life round about him. If he has sufficient daring, initiative, and power, he will modify it to some extent. He may even start some new form of it. The typical executive, however, operates in terms of the institutional environment as it is. His purchasing agent and his sales agent utilize rather than modify the tools they find ready to use.

4. The influence of social organization is quite as strikingly seen in the case of the executive's relation to the problems of personnel. Indeed, it is not too much to say that his personnel manager, or industrial-relations manager, or employment manager, or whatever he may be called, must operate not only in terms of the existing social organization but in terms of the historical development of that organization. Only as a result of an awareness of the development of industrial relationships—at least during the last two hundred years—can the personnel manager cope satisfactorily with the modern prob-

lems connected with incentive and output. His administration of hiring, discharge, promotion, discipline, safety, health, sanitation, welfare, collective bargaining, wage rates, and all the other difficult tasks in personnel administration must be in terms of the laws, habits, social attitudes, and institutional life governing this field. Here also opportunity exists for initiative, exploration, and discovery. But the typical manager is likely to use rather than modify in any significant way the instruments already in existence.

5. The case is not different with respect to the financial function and the administration of finance. Through several centuries devices and institutions have been developing in this field. Stocks, bonds, promissory notes, investment banks, commercial banks, savings banks, insurance companies, the Federal Reserve System, Dun's, Bradstreet's, collection agencies, credit men's associations, the corporation itself, form the merest beginning of the list of such devices and institutions. The financial affairs of any business, manufacturing or commercial, large scale or small scale, are administered in terms of the financial organization of society. The range of choices open to the manager is relatively limited.

6. Similarly also in the case of risk and risk-bearing. Modern industrial society is in its very nature a speculative society, the term being used with no opprobrium. The modern manager incurs risk in various forms resulting from almost innumerable causes. He meets these risks by means of institutions and devices. Of these the insurance company, of which there are dozens of forms, is the one more generally known. It is not, however, as important as is the speculative contract in its multitudinous forms. Any contractor who lets out, at fixed prices, sub-contracts in subordinate operations is relieving himself from the risk of price changes in these fields and such actions are multitudinous. Then, too, one must not overlook inquiry, research, and the growth of knowledge as factors in risk reduction. An outstanding fact with respect to the development of knowledge is the removal of business happenings from the realm of the unknown to the realm of the non-speculatively known. Herein, in part, lies the explanation of the recent movement for the establishment of bureaus of research in business houses. Herein, in part, lies the significance of knowledge as an economic function.

7. The manager's relation to social control has already been discussed in part. The institutional life connected with the functions enumerated above are forms or agencies of social control. The very fact that the manager operates in terms of this institutional life shows the extent to which he is subject to social control. If to this institutional life we add the forces of competition, private property, habit, custom, group psychology, public opinion, and finally of organized law, both written and unwritten, we have a social environment which envelops the manager's operations in as definite and influential a way as does his physical environment.

8. We come, finally, to his relation to the coherent, balanced, control of the various activities of his business. Here several outstanding matters strike one's attention. In the first place, he will administer the various problems of his business in terms of some established policy. This policy, the manager, influenced by his social surroundings and by his own individual attitudes and experiences, and by the owners if he is not himself the owner, must work out. In the second place, even a small business can be well conducted only in terms of a well-formulated organization. Various schemes of organization have been developed to meet varying needs in this respect. In the third place, modern business has become so large and so complex that measuring aids have been developed to give the manager more complete grasp of the control of his problems. Some of the best known of these are financial accounting, cost accounting, time study, mental testing, material testing, and specifications.

The modern business administrator is essentially a solver of business problems—problems of business policy, of organization, and of operation. These problems, great in number and broad in scope, divide themselves into certain type groups, and in each type group there are certain classes of obstacles to be overcome, as well as certain aids, or materials of solution.

If these problems are grouped (1) to show the significance of the organizing and administrative activities of the modern responsible manager, and (2) to indicate appropriate fields of training, the following diagram results:

DIAGRAM OF OUTSTANDING RELATIONSHIPS AND FIELDS OF TRAINING

Control
1. Communicating Aids of Control, for example
   a) English
   b) Foreign Language
2. Measuring Aids of Control, for example
   a) Mathematics
   b) Statistics and Accounting
   c) Psychology
3. Standards and Practices of Control

Of Problems of Adjustment to Physical Environment
- Appropriate Fields of Training
  - a) The Earth Sciences
  - b) The Manager's Relationship to These

Of Problems of Technology
- Appropriate Fields of Training
  - a) Physics through Mechanics, Basic, Other Sciences as Appropriate
  - b) The Manager's Administration of Production

Of Problems of Finance
- Appropriate Fields of Training
  - a) The Financial Organization of Society
  - b) The Manager's Administration of Finance

Of Problems Connected with the Market
- Appropriate Fields of Training
  - a) Market Functions and Market Structures
  - b) The Manager's Administration of Marketing (Including Purchasing and Traffic)

Of Problems of Risk and Risk-Bearing
- Appropriate Fields of Training
  - a) The Risk Aspects of Modern Industrial Society
  - b) The Manager's Administration of Risk-Bearing

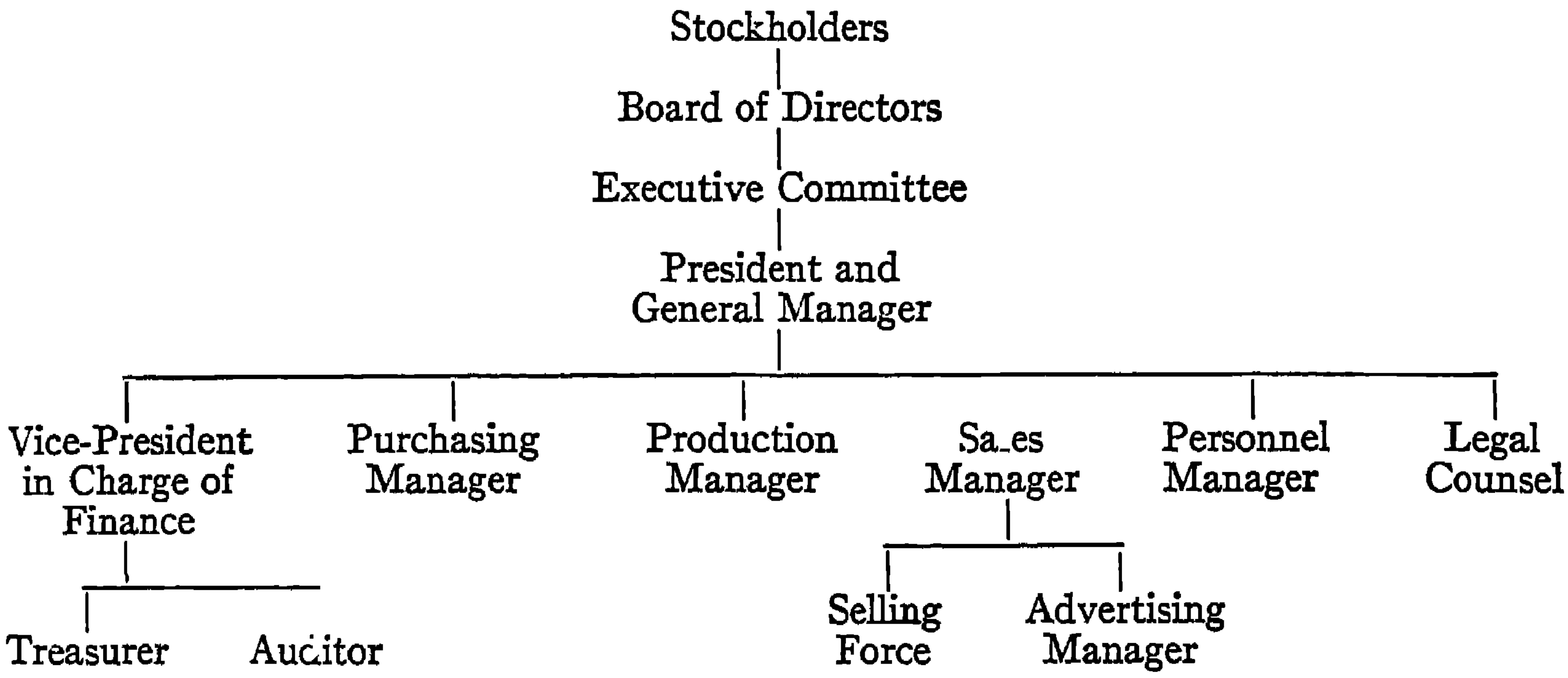
Of Problems of Personnel
- Appropriate Fields of Training
  - a) The Position of the Worker in Modern Industrial Society
  - b) The Manager's Administration of Personnel

Of Problems of Adjustment to Social Environment
- Appropriate Fields of Training
  - a) Historical Background
  - b) Socio-economic Institutional Life
  - c) Business Law and Government

As time has gone on, it has become clear that management itself must specialize if such burdens are to be carried. An authentic history of the differentiation of management has never been written. We know, however, that as the market widened, there sprang up functional middlemen, such as carriers, insurance companies, and banks, who (for a price) relieved the manager of some of his operations in such fields. We know also that, within his own organization, he began to use deputies or agents, such as the supercargo, the branch house, or the agent proper, in various managerial operations. As time went on, there came about such an increase in size of the business unit that the volume of "control work" reached the stage where men specialized in certain aspects of controlling and, to come down suddenly to

recent times, we find in a modern manufacturing business such functionaries as the production manager, the purchasing agent, the sales

POSSIBLE ORGANIZATION CHART OF A MANUFACTURING AND SELLING BUSINESS



manager, the treasurer, the advertising manager, the personnel manager, and the auditor. These are, of course, subordinate to the general manager, who may or many not be the owner of the business. He, more than any other functionary, holds a position kindred to that of the medieval craftsman—kindred, but very different indeed.

4. AN ANALYTICAL VIEW OF ADMINISTRATION

Let us arbitrarily use the term administration to include (*a*) policy formation, (*b*) the planning and setting up of the organization, and (*c*) the running of the organization. Let us, furthermore, note that it is something of a misnomer to ask for "principles" or "laws" of administration. *Administration implies action* and it is more appropriate to speak of sound *rules of action* in the field of administration than it is to speak of principles or laws. True enough, these rules of action may depend, for their appropriateness, upon some background scientific laws, as we shall later see. But that is another matter.

An illustration[17] will perhaps serve to make clear this use of terms. The following skeleton organization chart of a manufacturing business (any other business would have served as well for our pur-

[17] This illustration is taken, with changes in terminology, from a note by H. S. Person in the *Journal of Political Economy*, XXVIII (1920), 110.

poses) is divided into three broad zones according to the character of the administration which obtains in those levels. Zone I is concerned with policy formation—with the setting of goals in a large way and in general terms. Zone II is concerned with planning and setting up an organization to carry out these policies—to arrive at the goals. In this zone minor policies or sub-policies for the various departments are worked out by their chiefs in terms of the major policies of the business. It will be noticed that the general manager

THE ZONES OF BUSINESS CONTROL

	ZONE I Concerned with the determination of large policies	Stockholders Directors President
		GENERAL MANAGER
Control	ZONE II Concerned with organization, formation of minor policies, and "responsible" management	Executive Staff Requirements Control Progress Finance and Accounts, Design, Works Management, Personnel, Sales
		Planning Room
	ZONE III Concerned with "routine" management	Foremen Clerks Workers Clerks

occupies a border-line position. He operates in both zones. Zone III is concerned with routine operations containing the veriest modicum of policy formation and very little work that can be called organizing work. From the point of view of control this zone requires only routine management. The planning room occupies the border-line position between this zone and the one above it.

Administration, as we are using the term, is concerned with all of these. They are phases of administration. The diagram should not leave, however, an impression that it is possible to draw sharp dividing lines between the various terms we are using. Routine management shades off into responsible management and organization; or-

ganization shades off into policy formation; administration includes all of them, its creative work being done in Zones I and II.

We now address ourselves to the question, "Can we formulate sound rules of action in the field of business administration?" Frequently a specific problem clarifies issues. Let us assume that John Jones, mature and able but largely innocent of business knowledge, asks us to tell him how to go about determining what are sound rules of action in this field. Our answer might well run as follows:

I. Any action should be in terms of the phenomena—facts—in which the action is to occur. The first task, therefore, is that of securing *an appreciation of business facts,* or data. We cannot now stop to state the details of the enormous mass of data upon which action is to be taken. We can only point out certain elementary considerations connected with securing acquaintance with the necessary facts.

First of all, classification is an indispensable aid in securing a knowledge of business facts. They are so multitudinous that it is absolutely futile to try to survey them as isolated units. They must be taken in groups. Any grouping which is useful is a good grouping. Whether one expects to become acquainted with business facts through personal contact or through study of the experiences of others as set forth in printed volumes, he will find classification an aid to understanding.

But this is the merest beginning. These business facts or phenomena have their roots down deep in basic sciences such as physics, chemistry, the earth sciences, and the social sciences. To cite only one illustration, the business phenomenon of a differential wage system reaches back into such realms of study as psychology, history, and mechanics. There is no end to the amount of study which may be given to business facts if one cares to go below the surface. No one human being could possibly have a deep knowledge of all the basic sciences of business. On the other hand, one who expects to "administer" in the realm of business facts will do well to have a decent understanding of the main principles of the various sciences. In no other way can he really know business facts; in no other way can he administer in terms of fundamental principles as opposed to "rules of thumb." In other words, the study of business facts is not merely the

simple direct study one might at first thought suppose. One must know these facts in terms of a knowledge of the underlying sciences.

Third, new as our study of business administration is, we have already reduced many of the relationships of these facts to "standards," and one may wisely be on the alert for these standards. There are, for example, financial standards, standards of labor performance, standards of sales and purchase performance, and many others. Admittedly, our present standards are not all good. Some are indifferent. Some are positively bad. If, however, we come to know business facts in terms of the basic sciences we may confidently look forward to a steady and rapid increase of good standards. That is, indeed, the fundamental idea in so-called scientific management.

To summarize, in trying to arrive at good rules of action in business administration one must know business facts, and if one wishes to go far he must know them (*a*) in terms of an appropriate scheme of classification, (*b*) in terms of underlying scientific principles, and (*c*) in terms of standards of performance.

II. All this is merely preliminary to developing rules of action. Let us now assume that we are to lay down rules of action with respect to the administration of some entirely new project. Any project whatever may be chosen as an illustrative case. In any novel project one will not go far astray in laying down the following as an appropriate *chronology of action.*

1. The first thing to do is to get clearly in mind the objective. In most cases this objective should not be visualized or stated in terms so general that action is likely to be diffused and uncertain. It may be that a large objective must be narrowed down or, in some cases, broken into sub-objectives. It goes without saying that an objective can be set only in terms of the facts involved.

2. With the goal or objective, or objectives, in mind an appropriate second step is the selection of the proper road by which to reach the goal. (This may be called either a second step or a part of the first step, as one chooses.) In most cases, there is not one but several roads to a business goal and a phase of policy formation is the definite decision to use a certain road, or roads, to the exclusion of others.

3. Having selected the route (routes) which shall be used to ar-

rive at the determined goal (goals), the next series of steps to be taken in an enterprise of even moderate size is: (*a*) Plan the organization and control system which are to be used, and (*b*) instal them. Both these steps must be in terms of the facts at issue.

4. The next step is to operate the organization which has been set up.

III. A review of the last few paragraphs will show that they have been concerned with *what* to do. No rules of action have been suggested concerning *how* to do it.

The foregoing may all be summed up in diagrammatic form thus:

In the light of	Business facts which should be classified and understood in terms of basic sciences and reduced to standards	One can follow certain rules of action on	What to do in business administration	and can also follow certain rules of action on	How to do it

Let us next consider the rules of action concerning the "how" of administration.[18]

No apology is necessary for an attempt to formulate some definite basis on which to build a truly scientific art of management. The regulative principles of the art of management are three:

1. The systematic use of experience.
2. The economic control of effort.
3. The promotion of personal effectiveness.

1. *The first principle: The systematic use of experience.*—Experience is the knowledge of past attainment. It includes a knowledge of what has been done, and also how it has been done. It is inseparably associated with standards of performance, that is, with the ideas of quantity and quality in relation to any particular method of doing something.

The great instrument of experience, which makes progress pos-

[18] The remaining paragraphs in this selection are adapted by permission from A. H. Church and L. P. Alford, "The Principles of Management," in *American Machinist*, XXXVI (1912), 857–61; and A. H. Church, *The Science and Practice of Management*, p. 111. (The Engineering Magazine Company, 1914.)

sible, is "comparison." By systematic use of experience is meant the careful analysis of what is about to be attempted and its reference to existing records and standards of performance. In many cases it may be found that gaps in existing experience occur. In such cases the experimental determination of data may be undertaken, so that we have a full covering of the ground, either by the experience of others or from our own experimental determinations.

Experience tends to pass into traditional practice. That is its most useful form. Every kind of experience must pass into the mind of a man before it can be utilized practically; hence it follows that new experience should be crystallized into new traditions of practice as fast as possible.

New experience can be transmitted in one of two ways, either in minute instructions of which individual workers do not perceive the drift, or as a connected body of new practice. The latter form is the better, though it demands educational efforts somewhat apart from ordinary shop routine. Not until the new experience has become fixed as a habit will its full value be realized.

2. *The second principle: The economic control of effort.*—Effort is experience in action. Before we can do we must think, that is, dig into our stores of experience relative to the proposed undertaking. Having taken thought, we proceed to action.

In order to produce organized action it is necessary to control effort in various ways. These are: "division," "co-ordination," "conservation," and—in industrial undertakings—"remuneration." Most of the discussions about management are, in fact, discussions about the various methods and degrees of controlling effort and fixing its reward.

The co-ordination of effort is an inseparable counterpart of the division of effort. By co-ordination is meant the prearrangement of a number of separate efforts in such a manner as to produce a definite end. A still more perfect co-ordination is attempted when this end is to be attained in a definite time. Co-ordination in design means that unit parts are so designed that ultimately they fit together. Co-ordination in division of operations means that when all the operations are performed, certain definite shape and dimension are given to the

part. Both kinds of co-ordination are part of everyday practice, and are generally realized with a good percentage of success. Co-ordination of operations in regard to time is, however, a more advanced matter, and in many plants is still in a very unsatisfactory stage.

Effort requires not only to be divided and co-ordinated but also conserved. The conservation of effort means proceeding along the line of least effort to attain a given end.

The remuneration of effort has very little relation to any of the other manipulations of effort, for these would still be necessary if no remuneration was offered at all. But as no plants are manned with staffs who work for the mere pleasure of working or "for their health," the question of remuneration is very important.

3. *The third principle: The promotion of personal effectiveness.*—In proportion to the number of elements in a problem the difficulty of its solution augments. Personal effectiveness and its favoring conditions contain innumerable elements, many of which probably defy human analysis. Therefore we must proceed modestly and cautiously on the path of discovery, and far from attempting to lay down the laws, it will be well if we succeed in observing the interplay of a few of the most obvious conditions of personal effectiveness.

To begin with, we must assume physical health. From this it is but a step to recognizing that shop conditions must be such that health can be conserved. The real center of the problem is, however, not on the physical plane, or only incidentally so. The psychological elements are not so obvious, but they are much more important.

Some of the conditions of personal effectiveness are these: The individual must feel leadership; have adequate encouragement and reward; be physically fit and under good physical conditions; and receive a definite allotment of responsibility.

Recapitulation:

1. Experience must be systematically accumulated, standardized, and applied.

2. Effort must be economically regulated:

   a) It must be divided.

   b) It must be co-ordinated.

   c) It must be conserved.

   d) It must be remunerated.

3. Personal effectiveness must be promoted:
   a) Good physical conditions and environment must be maintained.
   b) The vocation, task, or duty should be analyzed to determine the special human faculty concerned.
   c) Tests should be applied to determine in what degree candidates possess special faculty.
   d) Habit should be formed on standardized bases, old or new.
   e) *Esprit de corps* must be fostered.
   f) Incentive must be proportioned to effort expected.

D. Some Aids to Administration

The conduct of a business enterprise may be said to be made up of three things: (*a*) the determination of the policy or policies which are to control the enterprise, (*b*) the planning and the setting up of the organization of the business, and (*c*) the running or the operating of this organization. No one of these three things is a static or unchanging; each of them must continually be redefined as the business proceeds. Furthermore, these three are not mutually exclusive; they overlap and interact.

The expression "business organization" can be used in the sense of the legal devices available in respect to the form of the business unit, and it can be used in the sense of a control device in manage- In this present section our attention will be directed mainly he control device.

siness organization is obviously not an end in itself. It is a f an end. It is a device for getting things done.

re is no one "correct" form of organization. Organization ccording to the size and geographical dispersion of the business, according to the character of the objective sought, according to character of the workers and equipment with which work is to be done, according to the character of the personnel available for executive positions, and according to the character of the operations in the business.

But while there is no one correct form of organization, while each business organization must be thought out in terms of the peculiarities of each given case, there are certain important classes or types of busi-

ness organization. The types most frequently discussed are line organization, staff organization, line and staff organization, and committee organization. As is true of so many of man's devices, these types of organization represent ways of thinking and acting that have become widely used.

No matter what type or types of organization the business manager may adopt, he finds available for his use various kinds of aids of administration. Among these are forms, records, reports, accounting, time study, motion study, job tickets, job analysis, budgeting—a veritable host. Practically all of these aids of administration may be grouped under two main classes: (1) measuring and computing aids of administration, (2) recording and communicating aids of administration.

It will be helpful to keep these issues[18a] in mind while reading the following selections:

1. Why is there and why should there be diversity in the forms of organization used? Is it reasonable to expect that all businesses will one day adopt some single form of organization?
2. What are some of the outstanding measuring and calculating aids or devices used in administration?
3. What are some of the outstanding communicating aids or devices used in administration?
4. We hear today of "the handmaidens of the new administration." What are they?

1. SOME TYPES OF ORGANIZATION

[Although there is no single correct form of organization of universal application, it is possible to make a survey of existing organizations and to see that they fall into certain rough types. One type shades off into another and a single business unit may have all types and many combinations of types in its various departments.]

[18a] A more detailed statement of issues may be found in *Outlines of the Economic Order*, pp. 177–81. (The University of Chicago Press.)

A. LINE AND STAFF ORGANIZATION[19]

There are two great principles in organization commonly known as line and staff, or, to use the terms preferred by some industrial engineers, "military" and "functional."

Line organization is essentially simple, mathematical subdivision. An army under a major-general is divided into brigades under brigadier-generals; each brigade is divided into regiments, under their colonels, and each regiment into battalions under lieutenant-colonels or majors; each battalion is divided into companies under captains; each company is again subdivided under its lieutenants, and so on down to the corporal with his squad. Promotion is step by step upward; the private may hope to be made a corporal, a sergeant, a lieutenant, a captain, a major, a colonel, a general. The lines of authority and responsibility run continuously through the whole body from top to bottom, as the veins of the leaf gather to the stalk, and many leaf-stalks to the twig, and many twigs to the branch, and many branches to the trunk; and veins and stalk and twig and branch and trunk have practically similar duties to perform in the life and growth of the tree.

Staff organization is a division according to functions—division by which one military department does all the engineering work for the whole army, another supplies all clothing, or rations, etc. It is the division by which the roots absorb moisture and salts from the earth, the leaf cells make chlorophyll, the sap carries the products of these laboratories to the cell-building processes of the tree. Staff functions are co-ordinate and co-operative, but they do not stand to one another in any order of ascending and descending scale. The captain, simply as captain, ranks and commands the lieutenant; that is a line relation. But the engineer, as engineer, does not command the quarter-master; the quarter-master does not rank and command the surgeon; the leaf does not rank the root; that is a staff relation. On the other hand, the captain is primarily responsible only for his own company; each branch of the tree supports only its own twigs and each twig its own leaves. That, again, is line organization. The scope of the individual is limited in area, but unlimited in responsibility within that area. But the engineer builds a bridge for the entire army—general, colo-

[19] Adapted by permission from C. B. Going, *Principles of Industrial Engineering*, pp. 41–44. (McGraw-Hill Book Company, 1911.)

nels, captains, and privates; each root and leaf contributes its share to the life of the entire tree. That is staff organization. The responsibility of the individual is unlimited in area, but limited to one function throughout that area.

The functions of staff and line are, therefore, not antagonistic; they are not alternative and rival systems of organization, between which we may choose and say we will adopt this or that and refuse the other. Line organization is essential to discipline and essential to the continuous existence of the whole body. If the general retires there must be a colonel to succeed him; if the captain is killed in action, the lieutenant must take command of the company, or the men are scattered and lost. Staff organization is essential to efficiency, each branch of it in its own particular function. If the commissary fails and there is no food for the troops, the engineer cannot make up for the deficiency by vigorously building bridges. Each staff must have a line organization within itself for discipline and continuity; but every complete organization must embody the principles of both line and staff if we are to secure the best results, the staff supplying expert functional guidance, applied through the line's direct control.

B. THE COMMITTEE SYSTEM[20]

Committees in general.—Factory problems are nearly always many sided and hence difficult of solution by any one man, especially where, under staff organization, he is charged with and capable of handling only one phase of the work. Furthermore, as before stated, when several men are on the same authoritative level there must always be some definite means provided so that they can harmonize their efforts. There is no way by which these ends can be served comparable with a good committee system. There are several inherent advantages in a good committee. First, it is impersonal in its action, and its verdict, like that of any jury, is usually based on the facts presented. The very atmosphere of a committee tends to compel all of its members to lay aside pettiness and personal prejudice and to act in accordance with the merits of the case. The foreman who would, over the telephone, blame a fellow-foreman for a delay will hesitate

[20] Taken by permission from D. S. Kimball, *Principles of Industrial Organization*, pp. 88–91. (McGraw-Hill Book Company, 1913.)

to do so in his presence or in that of his superior officers. The decisions of a committee are, therefore, likely to be more accurate than those of an individual because of the greater accuracy of its basic information. A misstatement on the part of a member is not likely to go unchallenged.

Secondly, committee meetings tend to promote a better understanding between men of the same authoritative level and of different levels. Distrust and jealousy of each other are rapidly eliminated as men know one another better and see the good side of each other's nature. There is something likable in all men if one can succeed in discovering it, and this can be done only by bringing them into close personal contact with common problems to be solved, not by wrangling and fault-finding, but by an earnest endeavor to find the very best solution. Thirdly, the committee method tends to awaken interest in the work and to draw out the best efforts of all of its members, and tends generally toward a better *esprit de corps.*

Committees are always of an advisory character. They cannot replace strong personality but they can be used effectively to assist a strong executive in finding out what is actually going on in the factory, in deciding what should be done, and in enlisting the good will of those under him. The best and most natural basis of committee work is a report on the matter under discussion, and reports are greatly enhanced in value when discussed by an intelligent and representative committee. There may be many kinds of committees and for many purposes. In general, committees should not be too large or too small. If too large they become very unwieldy, and if too small they may not secure a broad representation. A committee of six members is usually large enough.

2. DIVERSITY IN ORGANIZATION[21]

Various activities that are not industrial, such as the church, the civil government, the army, the navy, educational organizations, charitable organizations, all involve size and numbers and complexity, and they are all organized; but good industrial organization will be likely to differ from these other organizations, and all organiza-

[21] Adapted by permission from Russell Robb, *Lectures on Organization,* pp. 2–34. (Privately printed, 1910.)

tions will differ somewhat from each other, because the objects, the results that are sought, and the way these results must be attained, are different, and, moreover, the material out of which the organization is made differs in kind.

It is, of course, true that there is much that is common to all effective endeavor: the definite knowledge of what one wishes to accomplish; the principles of directing and controlling effectively large numbers of people; making the most of different kinds of skill; the securing of co-operation, so that each one helps instead of hinders another; the systematic and orderly way of doing things, so that there are no neglected steps, no false movements, no lost time—are all common to good organizations of all kinds. But, with differing purposes, the factors that make organization have varying importance. With one purpose in view, the principle of the division of labor for specialization of skill may be all-important; in another situation, this may become insignificant in comparison with the proper control and direction of large numbers. The problem in another organization may be the systematization and division of work mainly to bring order and efficiency into a situation of complexity. The significant feature in another case may be almost wholly a question of dispatch, where the question of economy even may hinge much more on the time required than on any other factor. Again, we may have success hinging upon systems of accounting, records, and statistics, where the accurate knowledge of costs and other details of the business and the system for securing these may be the central factor about which the organization is constructed.

In the popular mind, perfect organization usually is associated with the army. The division of the men into companies and regiments, the clearly defined duties and authority of the officers, the discipline that secures precision in all evolutions and obedience to all commands of the superiors, suggest to most people the perfection of concerted action, and furnish the type to which they feel that all organizations should conform as nearly as possible. An army in modern times, with its different branches of service, its attention to commissary and sanitation, its great multiplicity of technical appliances of war, its connection with the activities of civil life, becomes very complex; but in the beginning, military organization was a necessity in

order to direct and handle effectively large numbers of men, and so to prevent the hordes who went fighting from being merely a mob. The great numbers acting together could not act effectively unless there were order and system in all their evolutions, and an organization binding the order and system together. Moreover, the product came in one supreme moment: the organization was for an emergency. Its whole success or failure was shown by the action of the army at a critical time; and for this reason military organization has taken a severe line, in which everything is subordinated to obedience and definiteness of procedure and certainty of predetermined evolution and action upon command. Authority and responsibility taper down with evenness, each one knowing his exact limitations and his part. Each one in authority must be trained to assume instantly all the duties of the one next above, for the captain of one moment may be colonel in the next.

Military organization has contributed much to all other types of organization through its example of the value of discipline, the usefulness of definite procedure, and the effectiveness in administration of placing responsibility, but it has been the cause of mistakes in building up other organizations, through the forcing into prominence of the main features of a military organization when the end that is sought is much more influenced by other factors, when the necessity for control is less than for specialization of effort and for the coordination of different kinds of action. This becomes plainer when one considers, for instance, an industrial organization depending for its success very largely upon the ability with which the principles of division of labor are applied. There are many examples. The success or failure of the watch-industry would not depend upon instant obedience, upon definite evolutions of men, upon predetermined movement in emergency, upon a definite line of succession in authority; it would depend upon such things as study and care and economy in purchasing materials, upon the development of processes to make the most of each worker's special skill and ability, the saving of time in the handling of the product, the working of the plant to save interest and rent, the discovery of consumers, and the prompt delivery of the product. The main purpose is different from the main military purpose, and the organization must vary accordingly.

Large and complex construction is often undertaken where, in the words of contracts, "time is of the essence." The need for the structure may be vital to the integrity of an important business already established. The saving in interest and in earning power, if the work is completed in months instead of in a year or two, may be a large amount. The organization for such an undertaking will not be the same as for deliberate construction systematized in all details for the lowest total construction-cost. It may be necessary to cut "red tape" that would be desirable in other situations, it may pay to take the chances of less thorough deliberation of plans, the lines of authority even may be changed—all because the relative importance of factors is changed.

The construction of the great irrigating reservoirs in India, where a few years ago during the famine so many of the natives were employed, furnishes a good example of the variation in organizations according to the material one has to work with. One can imagine approximately what sort of an organization would be necessary in most other places to undertake the vast excavations necessary to form reservoirs in great irrigating works: there would be a large mechanical equipment of steam-shovels, with the minor organization of drivers, mechanicians, and superintendents, the systems of records, of fuel-supply and repairs; the placing of equipment; the orderly procedure of the work; the great number of workmen to direct and supervise; the system of pay, shelter, commissary, sanitation—all would have to be molded into a great comprehensive organization. In India there were no steam-shovels, mechanicians, fuel-supply, repairs, shelters, or commissary. The excavation was done directly by hordes of natives in gangs of twenty or thirty, each with his or her basket, and one with his little "scooper" or koiti. When the basket was filled, it went on the worker's head and was carried to the dump, where the native received a small tag that entitled him to payment for one basketful of excavation. The workers consisted of gangs, over which were the foremen who furnished the laborers for the work. There was no system of housing, for there were no shelters: all slept on the ground in the open. There was no commissary organization, for the workers "found themselves," and in any case would have refused any food prepared for them, because of caste prejudice. The payment of

workers required no elaborate system of pay-rolls and receipts, because each worker simply cashed in the tags he had received. No doubt those in charge of these Indian excavations had their problems of organization, but they were different from our problems, and probably the most of our approved systems would have been of about as much use as an American typewriter to a Chinese merchant.

There are all kinds of industries, and one is perhaps as good as another for the purpose of illustrating organization. If one is credibly informed, the organization of some of the patent-medicine companies differs considerably from that of other manufacturing companies, and yet they are still ably organized. There is at least one where two or three rooms in a large building are devoted to the manufacture of the medicine, a minor function in the organization. The remainder of the building is largely devoted to a printing establishment for the preparation of advertising matter, to advertising departments, correspondence-clerks, and stenographers. Here we have a manufacturing establishment, but the purpose and conditions require special attention to the office-system. The accomplishment of the purpose is not greatly affected by attention to manufacturing methods and details, but is very greatly affected by skill in advertisement and system in the departments where the real effort and most of the expense lie.

Most organizations have grown gradually, and the conditions surrounding this growth often influence greatly the form that the final organization takes. Long existence of customs and methods and the consequent knowledge of the plan throughout the organization may be of more importance than the features that might be secured by a theoretically better structure. It is understood, for instance, that the successful Studebaker organization was once administered by an executive committee of five members, each member of which is at the head of a functional department of the business. Committees are not ordinarily very effective as heads of undertakings. They have difficulty in reaching decisions, and one member is likely to prove dominant and carry his ideas without being responsible for the results. The Studebaker organization, however, had grown up about a family of five brothers, all able and active in the business. From small beginnings they had threshed out their problems together and had learned the art of conference. They had found how to draw from

each his contribution to the general knowledge and to the particular question, and they had discovered ways of reaching conclusions without interminable discussions or unplaced responsibility. One might hesitate to form a new organization on this plan, but he would just as surely fail to discard it when so completely established and so well proved in efficiency. In parts, at least, of many organizations one finds variations from the theoretically best plan on account of the personality or particular ability of important officers or heads.

It will be unfortunate if the emphasis given here to the diversity of conditions and to the difference in the purposes of undertakings should be construed as an argument that no general principles can be applied to organization. It is intended simply to show that there is no "royal road," no formula that, once learned, may be applied in all cases with the assurance that the result will be perfect harmony, efficiency, and economy, and a sure path to the main purpose in view. This is not an imagined difficulty. We all are inclined to get a bit twisted toward some favorite panacea, and if one is to attempt to better a business organization, it helps greatly to be able to approach the problem with an open mind, and not to have a special predilection toward a factor that one has somewhere found admirable.

3. ORGANIZATION PROBLEMS IN MANUFACTURE[22]

Manufacturing industries are, broadly speaking, of two general classes, namely, continuous and intermittent. In a continuous process the material goes in at the receiving end of the plant, is worked continuously, and appears at the shipping room as finished product. A continuous process may be either analytical or synthetical; that is, it may take some natural product and separate it into component parts or change its general form; as, for instance, the industries built on salt products, ore, oil and sugar refineries, saw-mills, etc. Or they may take a few natural products and passing them through fixed processes build them up into some other form, as may be seen in paint works and wall-paper factories. In general, such industries deal only with a few raw materials, these passing in at one end of the factory and flowing, so to speak, through a number of fixed processes and passing out at the other end in the form of a limited number of fin-

[22] Adapted by permission from D. S. Kimball, *Principles of Industrial Organization*, pp. 68–70. (McGraw-Hill Book Company, 1913.)

ished products and by-products. The organization that the personnel of such a plant will most naturally take will depend on the character of the industry, but will, in general, be comparatively simple.

Intermittent or interrupted industries, on the other hand, may take many kinds of raw material, carry them to any desired stage of completion, store the finished or semi-finished parts when necessary, and assemble the various kinds of finished products as the market requires. This finished product may cover a wide range both as to relative size and character. Ship-building plants, agriculture implement works, and plants manufacturing electrical machinery are excellent examples of interrupted industries which form by far the larger part of organized industry. The above classification is, of course, not clearly defined; in fact, these types of industry represent extreme cases rather than distinct classes. The natural tendency toward specialization constantly tends to limit the range of intermittent processes and this, in an extreme case, might reduce a factory of the intermittent type to one of the continuous type. Many factories, indeed, have both continuous and interrupted processes in operation at the same time. Plants of this kind tend naturally to divide into departments and are naturally more complex in character than those of the continuous type.

4. THE COMPTROLLER FUNCTION[23]

The following demarcation of duties supplied by H. A. Halligan, vice-president of the Western Electric Company, serves to illustrate the duties of the comptroller in a manufacturing company.

Several duties listed are obviously special assignments; for example, the responsibility of placing insurance and the issuance of general instructions.

1. General:
   - 1.1 He prepares such statistics and reports of the company's operations as may be required and has authority to require from all departments and houses such information as may be necessary to prepare such statistics and reports.
   - 1.2 He has charge of the accounting methods of the company in all departments and at all houses.

[23] Adapted from *Business Organization No. 1, The Functions of the Comptroller*, pp. 7–10. (New York: Metropolitan Life Insurance Co.)

1.3 He is responsible for auditing all accounts of the company and is appointed representative of the company in its relations with public accountants selected to certify to any published reports.

1.4 He prepares financial forecasts for use in determining the company's financial policy.

1.5 He obtains estimates from the general departments for the succeeding year and prepares budgets for these departments and for the company.

1.6 He is responsible for placing insurance in such amounts and in such manner as may be determined to be the company's established policy.

1.7 He approves all data on taxes and other statistical reports submitted to the general counsel before filing with public authorities.

1.8 His approval is required on all purchase and sales contracts which are on a cost-plus basis.

1.9 He has charge of the preparation and issuance of general instructions sent out under the authority of the president or vice-president.

1.10 He obtains recommendations from the various general departments as to changes in employees' rates of pay and submits summaries to the president and board of directors for their consideration and approval.

1.11 He advises on accounting personnel in all departments and at all locations.

1.12 The work of the department is assigned to the following departments:

1.121 Accounting Department.

1.122 General Statistical Department.

1.123 Auditing Department.

1.13 He approves all extra compensation plans, and certifies as to the amount earned by employees under approved compensation plans.

2. Accounting Department in Charge of Assistant Comptroller:

2.1 He prepares such statistics and reports of the operations of the company and its subsidiary and associated companies as may be required by the comptroller, and cooperates with other departments in preparing any special studies which they may require, based on the accounting records of the company.

2.2 He has charge of the inspection of costs of material furnished under contracts which are on a cost-plus basis.

2.3 He has charge of the annual inventories of the company.

2.4 He has charge of the annual inventories of the International Western Electric Company, Incorporated, and certifies as to the accuracy of the valuation placed on the assets as shown by the balance sheet of that company.

2.5 He is responsible for seeing that funds advanced by the Telephone Department to the Supply Department and the International Western Electric Company, Incorporated, are kept within the credit limits authorized by the president or board of directors.

2.6 He has charge of the collection of all quantity discounts and premiums

under the relations with suppliers and is responsible for the correct distribution of such items to the various general departments and distributing houses.

2.7 He notifies the general manager of the Supply Department of the cost of handling individual lines of merchandise and forecasts the probable outcome of proposed selling schedules.

3. General Statistical Department in Charge of Chief Statistician (Business Economist):

3.1 He has charge of the general statistical studies of the company and makes such special statistical studies of business and financial subjects as may be authorized by the comptroller.

3.2 He prepares for the comptroller special statements and analyses based on available statistics and cooperates with other departments in such of their studies as are based in part on the statistical records in his office.

3.3 He is responsible for advising officials of the company on the general business conditions of this country and other countries.

3.4 He keeps in contact with state and national agencies, furnishing statistical information.

3.5 He makes studies of statistics of the company and its subsidiary companies and makes forecasts and recommendations as a result of these studies to the end that the company may act intelligently and quickly in increasing or decreasing commitments in order to anticipate the expected increase or decrease in sales to customers.

3.6 He advises the accountants and statisticians in the various departments of the company and the officials of the subsidiary companies assigned to this work, so that they may at all times be informed as to the trend of affairs with particular reference to the reaction of the trend on their own business.

3.7 He makes such studies of statistics of employment and wages as may be advisable to determine the company's policy on these questions.

3.8 He makes such financial studies as will enable him to advise as to the probable course of interest rates.

3.9 He advises other departments of the company where statistical studies are now being made.

3.10 He maintains the nucleus of a general library and a key index to information of great general interest available within the company, and in this connection maintains files of all sufficiently important statistical reports and analyses prepared by the various departments of the company.

3.11 He makes studies of foreign exchange conditions in this country and others so as to be in a position to advise the officials of this company to the end that intelligent action may be taken on the transmission of funds from one country to another country.

4. Auditing Department in Charge of General Auditor:
   - 4.1 He has charge of and is responsible for the work of the Auditing Department.
   - 4.2 Subject to the approval of the comptroller, he prescribes the rules and conditions under which payments are authorized in all departments of the company.
   - 4.3 He audits the accounts of the financial officers of the company, and those of other employees who are entrusted with company funds.
   - 4.4 He is responsible for properly auditing the accounts of the treasurers of subsidiary companies.
   - 4.5 He audits the transactions in fine metals and minerals.
   - 4.6 He investigates at all locations to determine that surety bonds have been secured for employees as prescribed by the treasurer.
   - 4.7 He checks commitments and disbursements applying on specific plant appropriations granted by the board of directors and certifies to the correctness of reports covering such specific plant appropriations before they are presented to the board of directors for closing.
   - 4.8 He audits the journal entries of all departments of the company.
   - 4.9 He audits other records and accounts in all departments of the company, either completely or by test checks.
   - 4.10 He consults with the European comptroller and officials of allied companies as to auditing methods and routines to be followed in the foreign associated and allied companies.

5. THE BALANCE SHEET, THE PROFIT AND LOSS STATEMENT, AND THE BUDGET

A. THE BALANCE SHEET[24]

A balance sheet is a statement showing on one side all of the assets of a concern as of a certain date and on the other side all of the liabilities. Custom in this country places the assets on the left-hand side and the liabilities on the right-hand side. The difference between the assets and the liabilities, if the assets exceed the liabilities, is the net worth. In the case of corporations, this net worth will consist of capital stock, surplus, and undivided profits. In partnerships, the net worth will be the capital accounts of the partners, together with any undivided profits. If the liabilities exceed the assets, there is no net worth or capital belonging to the owners left, and the difference represents the amount that the concern is insolvent. The left-hand side of the balance sheet shows what property the business has and the right-hand side shows to whom this property belongs.

[24] Adapted from Paul Havener, *Analysis of Financial Statements.* (Privately printed.)

The assets of a business are of two distinct types—fixed assets and current assets. Both of these can be further divided, but to keep these two kinds of assets always separate is one of the most important things in reading a balance sheet. Fixed assets, also known as permanent assets, invested assets, etc., are those which represent capital sunk into the business that cannot be converted into cash except upon the liquidation of the business. They are usually such assets as land, buildings, machinery, equipment, furniture and fixtures, patent rights, good-will, etc. These assets are not in the regular course of business convertible into cash, and therefore cannot be used to pay the current liabilities of the business. Current assets, also known as liquid assets, floating assets, quick assets, working assets, represent cash and such other assets as in the regular course of business will be cash: such as accounts receivable, notes receivable, merchandise on hand, etc. All past due or doubtful current assets should be called slow assets. The purpose of most businesses is to convert current assets into cash as soon as possible.

The liabilities of a business are also of two types, but the distinction is not so great as in the case of the assets. The fixed liabilities are obligations which do not mature for several years. They are usually secured by mortgage on the fixed assets, such as mortgage notes, bonds, purchase money obligations, etc. Current liabilities, sometimes called quick liabilities, floating debts, etc., are liabilities which will have to be paid in cash within a short period of time, such as accounts payable, notes payable, pay-rolls, etc.

We have before us the balance sheet of A, B and Company, which is as follows:

BALANCE SHEET—A, B & CO.

As of June 30, 1929

ASSETS

Fixed:		
Land and buildings, etc.	$ 50,000.00	
Machinery and equipment	75,000.00	
Horses, wagons, etc.	5,000.00	
		$130,000.00

Carried forward

Brought forward

Slow:		
Accounts past due	$ 10,000.00	
Due from officials	20,000.00	
		$ 30,000.00
Current:		
Cash on hand	$ 21,000.00	
Notes receivable	2,000.00	
Accounts receivable	175,000.00	
Inventories	75,000.00	
		$273,000.00
Deferred:		
Prepaid insurance and licenses		$ 600.00
TOTAL ASSETS		$433,600.00

LIABILITIES

Current:		
Accounts payable	$ 40,000.00	
Notes payable	60,000.00	
TOTAL LIABILITIES		$100,000.00
NET WORTH		$333,600.00
Consisting of:		
Capital stock	$200,000.00	
Surplus	83,660.00	
Profit per year	50,000.00	
		$433,600.00

B. THE PROFIT AND LOSS STATEMENT[25]

The examination of the profit and loss statement is principally a matter of comparison, the object, of course, being to see whether the business is going forward or backward.

Let us now inspect the profit and loss statement of A, B and Company, just as we did their balance sheet.

The profit and loss statement is usually divided into sales, less cost of sales, which gives the gross profit, less expenses, which leaves

[25] *Ibid.*

the operating profit, then special deductions and losses are taken off and special additions are added thereon, giving the net income for the year.

ANALYSIS OF PROFIT & LOSS—A, B & CO.

For Twelve Months Ending June 30, 1929

Sales		$500,000.00
Goods on hand first of year	$ 60,000.00	
Goods purchased during year	415,000.00	
Total to be accounted for	$475,000.00	
Inventory at close of year	75,000.00	
Balance cost of goods sold		$400,000.00
Gross profit		$100,000.00
Expenses:		
Rent	$ 10,000.00	
Salaries	20,000.00	
Taxes	2,000.00	
Interest	4,000.00	
Miscellaneous	11,000.00	
Total expenses		$ 47,000.00
Operating profit for year		$ 53,000.00
Less:		
SPECIAL DEDUCTIONS & LOSSES:		
Bad debts	$ 5,000.00	
Fire loss	8,000.00	
	$ 13,000.00	
Plus:		
SPECIAL ADDITIONS:		
Profit on sale of real estate	$ 10,000.00	$ 3,000.00
Net income for year		$ 50,000.00

Percentages:

Gross profit	25 % on cost	20 % on sales
Expenses	11.75% on cost	9.4% on sales
Operating profit	13.25% on cost	10.6% on sales
Net profit	12.5 % on cost	10 % on sales

See also "Calculation and Measurement through Statistics and Accounting," page 362.

C. THE BUDGET[26]

The procedure to be followed by a business firm in the installation and operation of budgetary control is very similar to that of a governmental unit. A possible procedure, stated briefly in outline form, is as follows:

1. Each department prepares an estimate of its "activities" for the budget period. How these activities are stated depends on the nature of the operations of the department. The sales department states the sales it expects to make and the estimated expenses it will incur in making these sales. The production department states the estimated production for the period and the estimated cost of this production. The "service" departments, such as the personnel department, the traffic department, the auditing department, and the office manager's department, state the estimated expenditures of their departments. Because of the interdependence of these departments, some will need to use the estimates of other departments in making their estimates. For instance, the production department must know the estimated sales before it can estimate the production necessary to meet the sales demands; the treasurer must know the plans of all the departments before he can estimate his cash receipts and cash disbursements.

2. The departmental heads will transmit the departmental estimates to an executive who has supervision of the budgetary program. Sometimes the Comptroller acts in this capacity, while, in many cases, this duty is delegated to a member of the staff of the General Manager or President. This official combines the estimates of all the departments into a proposed budget for the business. This proposed budget should show the estimated receipts from all sources and the estimated expenditures by all departments of the business.

3. The official in charge of the budget program makes a comparison between the estimated revenues and the estimated expenditures as shown by the proposed budget. If the estimated expenditures exceed the estimated revenues, one of the following courses of action must be taken:

[26] Adapted by permission from *Budgetary Control for Business*, pp. 1–17. Prepared under the direction of J. O. McKinsey. (Boston Chamber of Commerce, 1921.)

a) The departmental expenditures may be reduced. In making such reductions a problem arises which is not usually involved in the reducing of governmental expenditures, namely, the reduction of expenditures may result in a reduction of revenues.

b) Additional capital may be secured. If it is not deemed wise to reduce expenditures, plans must be made to secure additional capital with which to finance the excess of expenditures over revenues.

The officer in charge of the budgetary program may make recommendations with reference to possible procedure, but he is usually not invested with authority to determine the plans to be followed.

4. The proposed budget, as prepared by the officer in charge of the budgetary program, is submitted to an advisory committee, composed of the principal executives of the company and presided over by the President. This committee considers the proposed budget and makes such revisions as it thinks necessary. In case the proposed budget involves important changes in the company's policy, or involves significant plans of financing, it may be necessary to submit it to the Board of Directors for consideration.

5. Each department makes plans which will enable it to carry out its program as outlined under the budget. For instance, the advertising department makes contracts for advertising space; the sales department sets quotas for its salesmen; the production department through its planning department sets up schedules of production.

6. Proper records are established that the performance of each department may be properly recorded and comparisons made between the estimated and the actual performance. Periodic reports are made to the executive in charge of the budgetary program and are by him transmitted to the Advisory Committee, and in some cases to the Board of Directors, which show a comparison between the estimated and the actual performance of each department for the period. Based on these reports, the Advisory Committee, or Board of Directors, may make such revisions of the budgetary program as it may deem desirable.

Budgetary control, if properly executed, accomplishes the following results:

1. Co-ordination of sales and production,[27] (*a*) by estimating sales possibilities and planning production to produce the goods necessary to meet these possibilities; (*b*) by limiting production to the amount necessary to meet probable sales demands as shown by the sales estimate and thus preventing an excess inventory of finished product.

2. The formulation of a profitable sales and production program, (*a*) By determining the lines of goods most desirable for a well-rounded sales program and adapting production, in so far as is consistent with (*b*) below, to produce the necessary quantity of these lines; (*b*) by determining the lines of goods most desirable for a well-rounded production program and planning sales, in so far as is consistent with (*a*) above, so as to sell the amount of these lines necessary to secure economical production.

3. Proper control of expenditures, (*a*) by requiring the preparation by each department head of an estimate of the expenditures of his department during the next budget period; (*b*) by requiring the submission of these estimates to the Advisory Committee (a committee composed of the chief executives of the business) for consideration and approval; (*c*) by the prohibition of any expenditures in excess of the departmental estimates without the permission of the Advisory Committee; (*d*) by requiring the submission of monthly reports showing a comparison between the actual expenditures for the month and the estimated.

4. Formulation of a financial program, (*a*) by the estimating of cash receipts based on the sales program and the estimate of collections; (*b*) by the estimating of cash disbursements based on the production, purchasing, plant and equipment, and departmental expense budgets; (*c*) by determining the excess of disbursements over receipts and the preparation of a financial program which will secure funds to provide for this excess.

5. Co-ordination of all the activities of the business, (*a*) by the preparation by each department of an estimate of its activities during the budget period; (*b*) by the studying of these departmental esti-

[27] The points here brought out with reference to co-ordination of sales and production in a manufacturing business apply as well to co-ordination of sales and purchases in a mercantile business.

mates by the departmental executives and the Advisory Committee; (*c*) by the modification of the activities of each department to the end that they co-ordinate with the activities of each other department; (*d*) by the preparation of an estimated balance sheet and an estimated statement of profit and loss showing the anticipated results of the operations provided for by the budgetary program; (*e*) by the formulation of plans and policies which will make possible the attainment of the estimated results as shown by the financial reports prepared in (*d*) above.

Before it is possible to proceed with the operation of a budgetary program, it is necessary to formulate an organization by which its operation will be effected. The budgetary program contemplates the co-ordination of the activities of all the departments into a program for the business as a whole. It is obvious that it is not desirable for this co-ordination to be undertaken by any one of the departments which is to be subject to the control exercised in its accomplishment. This responsibility must be vested in an authority which is independent of any department. Consequently control of all matters pertaining to the budgetary program is usually vested in the President of the Company. In most cases he delegates a considerable part of his authority to a staff assistant who has direct control of budgetary plans and procedure. To provide a central control of budgetary plans and to bring about co-operation and co-ordination there is often created an Advisory Committee composed of the heads of the principal departments and presided over by the President. This Committee must approve all estimates before they become effective. The responsibility for the preparation of the departmental estimates is placed upon the heads of the departments. In some companies after the budget is approved by the Advisory Committee it is submitted to the Board of Directors for consideration and approval.

6. COST-ACCOUNTING[28]

The underlying idea of all methods of expense distribution or apportionment is to use some one or more of the visible, tangible measurable elements as a gauge, and to prorate the expense allotment by it.

[28] Adapted by permission from C. B. Going, *Principles of Industrial Engineering*, pp. 97–104. (McGraw-Hill Book Company, 1911.)

That is, they burden each job or each unit of product in proportion to the material that goes into it, or the wages paid for it, or the time spent working on it, or the use it makes of the machines and other facilities in the factory. This gives us five cardinal methods of expense distribution: by material, by percentage on wages, by man hours, by machine rates, and by production factors. We will take up their operation and their characteristics successively.

Distribution of expense by material is a method of limited applicability. Its usefulness is confined to comparatively simple industries such as metallurgical or structural material works, where the product is nearly or quite uniform. In a brick yard, or a blast furnace plant, or a gas works, or perhaps in a pipe foundry or other establishments of like character, it may work as well as any other plan, simply because there is no need of distribution, properly speaking, but only of equal subdivision. Indeed, if the product of a plant is absolutely homogeneous—all just alike—it makes no difference whether you apportion expense by count, or weight, or measure, or flat cost—you cannot get wrong as between one unit and another.

The *percentage-on-wages* method of apportioning factory expense is probably the most generally used. As a starting-point in this method, we take the total for a given time (say a month or a year) first of the wages of the productive labor during that period, and second of the factory expense during the same period, and we find what is the percentage relation of the expense to these wages paid to productive labor. Suppose we find that the total factory expense is 60 per cent of the direct labor pay-roll; then we load every job done during the period with 60 cents additional for each dollar of direct wages that is expended upon it.

The third method is the *man-hour plan.* It varies from the preceding system in that the distribution is made proportionate to the *time worked* on each job instead of to the *money paid* for that time. At the first glance this might seem like the same thing, but on further consideration it will become evident that there are important differences. For example, suppose we take a job away from a $3-a-day man, and give it experimentally to a good clever $1.50-a-day helper who completes it in the same number of hours that his predecessor did. Under the man-hour plan it will still carry the same ex-

pense burden as it did before, because it takes the same time. This is a correct result, for the mere change of operative has not changed in any way the demand which the work makes upon the general organization and facilities of the plant; has not changed in any way the amount of expense it creates, and hence should not change the expense apportioned to it.

In some particulars, therefore, the man-hour plan is more correct than the percentage-on-wages plan, but when we look a little farther we find that, like the percentage-on-wages plan, it takes no cognizance of the machine element. *All* jobs taking two hours are burdened the same, whether the two hours' time is on a valve-seat grinder or on the largest engine-bed planer in the shop.

The *machine-hour method* of expense distribution makes a much closer approach to accuracy than either of those so far described, because it recognizes the fact that in modern manufacturing the producing unit is not a single individual, but a complex combination of the machine or piece of apparatus, the man or men tending this machine, the equipment surrounding the machine, and the suitably prepared space necessary for the installation and operation of the machine. In further explanation of this method of expense distribution the term "machine" is used in a general sense, with the understanding that it includes anything from a soap kettle to a jeweler's lathe.

In the administration of the machine-hour method of apportioning factory expense, the preliminary step is to determine on an hourly basis the cost of running each machine in the works. This cost includes the charge for rental, lighting, and heating of the space the machine occupies, and the surrounding space necessary for its operation; interest on the cost of the machine and allowance for repairs and depreciation; cost of power to run the machine; cost of services, such as cranage and transportation of various kinds to feed or to remove materials; cost of indirect labor attendant upon the machine; any incidental or special expenses; and a just proportion of the general burden of administration, superintendence, non-productive factory labor, etc.

Having obtained the totals of these various charges for a month or a year, they are divided by the number of hours during that time the machine can be expected to run, this figure being reached by a

careful study of past experience and if necessary corrected by later actual observation. The quotient is the hourly rate of that machine. Every job coming to the machine is then assessed with this charge for the number of hours or fraction of an hour it spends on the machine.

Expense distribution by production factors is an extension or development of the machine-rate method influenced by a new way of looking at the whole process of production. The central idea of it, as developed by its sponsor, Mr. A. Hamilton Church,[29] is that manufacturing is carried on by a combination of what this authority calls "services," of which labor is but one. The principal services or production factors other than labor are land and buildings, lighting, heating and ventilation, power, stores and transport, organization, management and supervision. These are distributed by various methods of apportionment, Mr. Church's test question being always, "How would a manufacturer pay for this service if (as might be the case with light or power or land and buildings) he purchased or hired it from an outside source instead of mingling the supply of it with his own characteristic function as mere manufacturer?" Thus, the expense attendant on the provision of land and buildings, or of light, heating and ventilation, is distributed on the basis of square feet or square yards of floor space, or, to use Mr. Church's term, on "capacity-area"; power is distributed by horse-power years or horse-power hours; stores and transport are assessed departmentally, with consideration of the weight, bulk, activity of movement, and other matters affecting the actual cost of storage and movement of materials. These separately distributed rates are then combined into hourly rates applying to various so-called "production centers," a production center being a machine, a group of machines, an individual work bench, an area of floor space, or any distinct element in the process of manufacture; these hourly production-center rates are then imposed on individual jobs, as these jobs in their progress employ the time of the different production centers.

See also "Direct and Indirect Costs," page 732.

[29] A. H. Church, "Production Factors in Cost Accounting and Works Management," *Engineering Magazine.*

7. INDUSTRIAL STANDARDIZATION[30]

Notable developments have been made in industrial standardization in the mining, electrical, mechanical, and other engineering fields, and in the further extension of standardization through professional, industrial, and trade association activities.

Industrial standardization consists in singling out specific products and materials, in settling upon their performance properties and dimensions, and in concentrating upon them both in production and in use to the end of bringing about the greatest possible industrial efficiency. Such standardization includes:

1. Nomenclature, such as definitions of technical terms used in specifications and contracts, also technical abbreviations and symbols.

2. Uniformity in dimensions necessary to secure interchangeability of parts and supplies, and the interworking of apparatus.

3. Quality specifications for materials and equipment, as, composition, form, and structure.

4. Method of tests to determine standards of quality and performance.

5. Ratings of machinery and apparatus under specific conditions.

6. Safety provisions and rules for the operation of apparatus and machinery in industrial establishments. Safety codes and standards of practice.

Advantages of standardization.—The important rôle which standardization plays in industrial evolution, and its economic and social potentialities, are only beginning to be generally understood. Following are significant aspects of standardization, when carried out on a sound engineering basis:

1. Standardization stabilizes production and employment, since it makes it safe for the manufacturer to accumulate stock during periods of slack orders, which he can not safely do with an unstandardized product.

2. It reduces selling cost. This is generally overlooked. Possibilities of reduced costs are generally even greater in distribution than in production.

3. It enables buyer and seller to speak the same language and makes it possible to compel competitive sellers to do likewise.

[30] Adapted from Irving S. Paull, J. W. Millard, and James S. Taylor, *Trade Association Activities*, pp. 84–95, "Domestic Commerce Series," No. 20. (U. S. Government Printing Office, 1927.)

4. In thus putting tenders on an easily comparable basis it promotes fairness in competition, both in domestic and in foreign trade.

5. It lowers unit costs to the public by making mass production possible, as has been so strikingly shown in the standardization of incandescent lamps and automobiles.

6. By simplifying the carrying of stocks, it makes deliveries quicker and prices lower.

7. It decreases litigation and other factors tending to disorganize industry, the burden of which ultimately falls upon the public.

8. It eliminates indecision both in production and utilization—a prolific cause of inefficiency and waste.

9. By concentrating on fewer lines, it enables more thought and energy to be put into designs, so that they will be more efficient and economical.

10. By bringing out the need of new facts in order to determine what is best and to secure agreement on moot questions, it acts as a powerful stimulus to research and development, and it is thus in decided contrast to crystallization resulting from fixity of mental attitude.

11. It is one of the principal means of getting the results of research and development into actual use in the industries.

12. It helps to eliminate practices which are merely the results of accident or tradition and which impede development.

13. By concentration on essentials and the consequent suppression of confusing elements intended merely for sales effect, it helps to base competition squarely upon efficiency in production and distribution and upon intrinsic merit of product.

14. Standardization is increasingly important for the maintenance and development of foreign trade. There is strategy in nationally recognized "American" specifications.

15. The efficiency of competing countries, increasing through national standardization programs, is liable to transfer competition from foreign markets to our own shores.

16. Joint effort in bringing about standardization within and between industries almost invariably leads to better understanding and to beneficial cooperation along other lines—a step toward the integration of our industries.

Stages of development.—The process of industrial standardization may be conveniently divided into four stages, namely, (1) by individual firms; (2) by societies and associations; (3) on a national scale; (4) on an international scale.

Standardization by individual firms is now well developed in all the principal industrial countries. It has been the essential factor in the development of mass production, which has been the chief contribution of the United States to the development of industry.

The extensive company standardization developed during the last half of the nineteenth century inevitably gave rise to standardization by industrial groups. This work, which has been carried out by technical societies, trade associations, and Government departments, working individually, has, with a few notable exceptions, been a development of the present century.

Just as standardization by individual companies led to standardization by groups, so it in turn has led to interindustry standardization on a national scale. In this the trade association and the technical society play much the same rôle that the individual company does in standardization by separate branches of industry. All the leading industrial countries have found it necessary to establish national standardizing bodies. At present there are 20 such national bodies, all but one of which have been organized during or since the World War.

See also:
"Some Significant Standards, Their Meanings and Purposes," page 365.
"Standardization and the Machine Process," page 557.
"Principles and Devices of Scientific Management," page 800.

8. SIMPLIFIED PRACTICE[31]

Simplified practice, meaning the collective effort of an industry to reduce waste in the production and distribution of its products, through eliminating unnecessary varieties in sizes, dimensions, grades, or qualities, is now widely recognized and well established. Interest in simplified practice was developed out of the war-time contact of various industries with the War Industries Board. Interest was further stimulated by the survey of waste in industry made under direction of Secretary Hoover and a committee of the American Engineering Council early in 1921. The establishment of the division of simplified practice in the Department of Commerce in November,

[31] Adapted from Irving S. Paull, J. W. Millard, and James S. Taylor, *Trade Association Activities*, pp. 75–6, "Domestic Commerce Series," No. 20. (U.S. Government Printing Office 1927.)

1921, provided a clearing house or centralizing agency through which manufacturer, distributer, and consumer groups could meet to discuss their common problems and could decide upon eliminations of mutual benefit.

Through the cooperative relations between industrial and commercial groups and the division of simplified practice, 243 trade associations have, to date, promulgated and accepted 60 simplified practice recommendations and have thereby pledged themselves to adhere to these recommendations as their "standards of practice" in manufacturing, selling, or purchasing the commodities covered in the recommendations. Individual firms or companies, to the number of 4,986, have similarly pledged their support to these recommendations.

This degree of adherence is in itself fair evidence that the objectives sought through simplified practice are being realized. These objectives, briefly stated in terms of the interests they affect, are as follows:

To the manufacturer, simplified practice means—

(1) More economical manufacture through less idle [illegible] equipment, better scheduling of work, accurate cost accounting, long runs on large units, simplified packing, simplified material inventory, reduced cost per unit.

(2) More efficient labor through less seasonal fluctuations in employment, increased individual output, greater skill of workmen, [illegible] ease of training employees, simpler and better inspection, smaller [illegible] turnover, greater earning power.

(3) Less capital tied up in raw materials, special mechanical equipment, semifinished stock, finished stock, storage space, repair parts.

To the distributer—

(1) Increased turnover due to concentration of stock; staple lines—easy to buy, quick to sell—no slow-moving numbers; more effective sales force; more concentrated sales effort.

(2) Less overhead and better service through lower handling charges, less stock depreciation, smaller clerical forces, less obsolescence, quick and reliable delivery, fewer misunderstandings and errors.

(3) Decreased capital requirements for maintenance stocks, for packing materials, for storage space, for interest and other charges; also fewer complete lines to carry, and less operating margin required.

To the consumer:

Better value for money, better quality, prompt deliveries, quick replacement service, lower maintenance costs, simplified specifications, protection against unscrupulous traders.

E. Scientific Management as Exemplified by the Taylor System

Business management is, of course, as old as business. To go no farther back than medieval times, it is clear that the master craftsman engaged in business management. In business management, as in so many other kinds of man's activities, rules of operation gradually emerged because they were found "to work," although man did not always know precisely *why* they worked. They were rules of thumb, not rules based on scientific law.

Within quite recent times scientific analysis of problems has been extended to the field of business management. The scientific management movement had its first spectacular development in the field of manufacturing, but it has been taken over into other types of business operations. In terms of its ideals, it seeks to apply to business management the scientific methods that have been found so fruitful in other fields. In terms of its actual practices, it has fallen short of its ideals. The movement, however, may fairly be said to have caused a new and refreshing current of thinking with respect to the effective control and operation of our social resources.

The selections in this section will be found particularly helpful in connection with these[31a] issues:

1. Is the scientific management movement a "sport" in social organization or is it a part of one of the major currents of the time?
2. What increased responsibilities does scientific management place upon business administrators?
3. It is said that scientific management makes possible prevision, prediction, and precise control. What preliminary work must be accomplished before these are attainable?
4. Do "impersonal laws of management" tend toward democracy or toward autocracy in industry?

1. THE BEGINNINGS OF SCIENTIFIC MANAGEMENT[32]

[In various places in this volume we have caught glimpses of the forces which along about 1880 conspired to bring in a new order of economic phenomena. This present selection, written in 1912 when

[31a] A more detailed statement of issues may be found in *Outlines of the Economic Order*, pp. 181–86. (The University of Chicago Press.)

[32] Adapted by permission from C. B. Going, "The Efficiency Movement," *Transactions of the Efficiency Society*, I (1921), 11–17.

the efficiency movement and scientific management were just beginning to attract widespread popular attention, will be found to be a useful addition to these glimpses.]

The history of the efficiency movement is like that of many another extension of knowledge, whether physical or mental. It is a record of independent partial contributions of discovery or interpretation, which later are found to be all interrelated parts of one great, harmonious and comprehensive whole.

Taking only the larger manifestations of this faith, we may identify distinctly at least seven which have come into being and have gathered force and volume within approximately the last century—some of them, indeed, within the last generation and a few within the last decade.

The first is the profession of engineering, which has grown up from the root idea of efficiency in the use of power and mechanical effort, and has carried this vitalizing principle into every branch into which it has expanded.

The second is the conservation movement, seeking to prevent hitherto reckless waste in the use of natural resources and the fundamental materials of industry.

The third is fire prevention, which looks toward better protection from a special form of waste of structures, equipment, and manufactured products.

Fourth, we find the propagandism of general hygiene and its extension into the wider sphere of eugenics, adapting the theory of conservation and the ideals of waste-prevention to the individual human unit and to the race at large.

Fifth comes welfare work and the effort toward reduction of industrial accidents—a manifestation differing distinctly in scope from general hygiene, and addressing its effort toward a particular class and a specialized purpose.

Sixth, in scientific management (using the term in a broadly descriptive sense, and not the narrow titular one in which it has sometimes been monopolized) we find generically the same concept, worked out into concrete policies and methods intended to raise the efficiency of processes and the prevention of waste in production, supervised or secured by human toil.

Seventh, less manifestly but no less truly, earnest prosecution of cost study and analysis, which leaped so strikingly into notice less than twenty years ago, is part of the same impulse—a potentially and then actively constructive application of effort toward efficiency in the realm of money.

To this group of seven distinctive manifestations of a single impelling idea in seven different fields should perhaps be added an eighth—the movement toward greater efficiency in government.

It is only in the field of application and in the elements or facts to which the effort is applied that these several movements differ. The essential concept or energizing ideal is always the same. It is the elimination of waste. It is the raising of the ratio of useful result to effort expended. It is the bringing up of actual performance as near as possible to the level of a reasonable and equitable standard.

What might be called a self-conscious attempt at the improvement of industrial efficiency was specifically expressed in the literature and thought of the subject by occasional contributions dating back to the first half of the nineteenth century, although no well-informed wave appeared until about a quarter of a century ago. Perhaps it would be truer to say that there were two waves of thought, starting at different points of the horizon but converging and gradually coalescing.

The first of these impulses was originally analytical and was addressed to the careful, critical examination of costs, with a purpose of discovering the elements of expense and reducing them to basic units, so that one cost could be compared accurately, intelligently, and usefully with another. This is of course vitally necessary to the determination of standards, and on the fixation of standards depends the measurement of efficiency. The literature of cost study did not become prominent until about 1896, but from that date on it increased rapidly in volume and in intensity and definiteness of interest.

The second impulse was primarily constructive and addressed to individual situations with the purpose of reducing existing costs, whatever they might be, sometimes without very definite vision of either absolute, attainable standards, or of the relative importance of the factors attacked; but always with confidence that progress toward better things could be made, and *would* be made if any factor in the

expense formula were diminished. For that was the underlying purpose in the earlier wage systems, and in the work of the sincere systematizers, who did much good, however many crimes may have been committed in the same name by later and less genuine disciples.

These agencies rapidly developed into the more complete, better balanced, and earnestly considered policies of comprehensive control, of which so-called "scientific management" is the most widely known example.

In a rapid review of this modern constructive movement for the betterment of industrial efficiency, the first efforts (first, at least, if we follow the order of public announcement) centered upon the workman, as the man most familiar with the conditions and possibilities of every operation, and took the form of offering an inducement to him to increase his output by a better use of his knowledge, skill, and the facilities supplied. These measures were proposed in Mr. Henry R. Towne's "Gain Sharing," and reduced to more specific and practical methods in the Halsey premium plan, published in 1891, and in the Rowan, Ross, and other forms of premium payment which are substantially modifications of Halsey's idea.

While these measures were dictated by a sincere attempt to promote efficiency, they had faults of two opposite kinds. First, as the only element directly acted upon was the worker, many inefficiencies might still remain uncorrected in materials, machinery, processes, distribution, and sequence of work, or other matters. Second, in the temptation of increased earnings, with no accurate determination of a standard method or task, a worker might be stimulated to overexertion.

Five years later, in 1896, Frederick W. Taylor presented the differential piece-rate method, in which there is to be found a definite suggestion of organized methods designed to check both these tendencies, while still retaining the incentive of reward for high performance. It is scarcely more than a suggestion. The only specific institution proposed is a rate-fixing department, replacing by careful and thorough study the somewhat haphazard methods of setting standards by the judgment (or guess) of a foreman or minor official. The working conditions, upkeep of machinery and tools, dispatching and routing of jobs, etc., are broadly referred to as details in which the

management should co-operate; but the prime force in the system is repeatedly stated to be the desire inspired in the worker to obtain the larger wages paid for accomplishment of the established task.

Five or six years later another important advance toward full recognition of the necessities for efficient working appeared in H. L. Gantt's paper on "Task and Bonus" (1901), supplemented by his second paper on "Graphical Daily Balance" (1903), both presented to the American Society of Mechanical Engineers. These formulated a complete scheme of management involving the use of scientific principles. In addition to the careful, thoroughly informed study of the operation and of the best way of performing it, there now appeared the added elements of printed scheduled instruction cards, and of deliberately appointed instructors, showing the workers how to perform the task. The method of payment, while it retained the bonus award to the successful task-worker, no longer penalized the worker who tried but failed. He was still protected in the ruling day rate of his class.

Immediately thereafter, also in 1903, came Frederick W. Taylor's classical contribution on *Shop Management,* in which all the foregoing elements were embodied and incorporated with still more advanced ideas of scientific control of manufacturing operations. Much more attention was given to elementary time study as a basis for scientific time setting. Most striking of all, a new form of organization was proposed. All work was first separated into the two great functions of planning and execution. Each of these functions again was subdivided into four. Functional organization instead of fractional was proposed as the efficient means of performing all work in the most efficient manner.

About five years later yet came two contributions of unequal importance but both significant. The first was the suggestion, by Charles U. Carpenter, of the committee system, characteristic of a school of thought which I have elsewhere called the "school of suggestions" because it depends chiefly upon creating an attitude of mind in the managing officials. The second was Harrington Emerson's proposal of the "efficiency system," defined first in his book *Efficiency as a Basis of Operation and Wages,* and amplified in *The Twelve Principles of Efficiency.*

Mr. Emerson, like the specialists who preceded him, accepted most of the elements of scientific operation already recognized, as, for example, time study, task setting, standardized methods and standard instructions, dispatching and schedules of work. He recognized fully also the necessity of functional as well as fractional distribution of duty in any efficient organization. Instead, however, of the functional foremanship advocated by Taylor, Emerson adopted the model of line and staff furnished by the Prussian military organization, which was so triumphantly successful in 1870–71.

More important, however, than any institutional forms or measures advocated was Emerson's recognition of efficiency as a universal ideal—his identification of the agitation going on in industrial fields as part of something world-wide, indeed, universe-wide—as part of a great awakening to the sinfulness of waste, and of a struggle toward better utilization of the materials and forces supplied by an infinitely efficient nature.

Efficiency, therefore, is a concept immeasurably larger, vastly wider, and more general in its relations and applications, than scientific management, which is often mistakenly used as if it were a synonymous term. Scientific management is one mode of promoting efficiency in one class of situations. The Taylor System is the most highly developed, most completely institutional, and therefore most closely specialized form of scientific management.

2. PRINCIPLES AND DEVICES OF SCIENTIFIC MANAGEMENT[33]

Mr. Taylor insists that the general principles, or philosophy, of scientific management should not be confused with the mechanism, which is merely incidental. He emphasizes four fundamental principles. First, the method of scientific management is the method of a true science. The organizing engineer "objectifies" a plant to be organized; he enters as an "outsider," bound by no traditions and prejudices of its management, holds it, so to speak, at arm's length, studies it by departments and as a whole, compares it with other similar plants of his experience, and observes defects that the "in-

[33] Adapted by permission from H. S. Person, "Scientific Management," *Proceedings of Tuck School Conference* (1912), pp. 4–5, and "Scientific Management," *Bulletin of the Taylor Society,* II (1916), 17–19.

sider" does not see. In this process the truly scientific method of analysis into units and experimental recombination of them is followed, not superficially but exhaustively, until enough data are collected from which trustworthy laws may be derived.

A second general principle of scientific management is that there should be, and as a result of the laws derived by observation and experiment may be, a scientific selection of machines, material, and workmen.

The third principle of the new management is that a workman once discovered and assigned to the performance of the function to which he is adapted, the management should provide continuous instruction for him.

The fourth of Mr. Taylor's principles of scientific management is that there should be intimate co-operation between management and men and a redistribution of responsibilities. The workability of the new management, says Mr. Taylor, depends upon such sympathetic co-operation. There must be mutual recognition of the possibility of mutual helpfulness. This recognized, there must be a readjustment of duties, for under present systems of management there is required of a workman so much as to make impossible his highest efficiency. The manager, under the present system, requires of the workman simply the accomplishment of a certain result. To the workman is left the determination of the methods as well as the actual performance. Under scientific management the experts in the planning room determine the method and leave to the workman freedom to apply all his energy to actual performance.

These four general principles constitute, according to Mr. Taylor, the philosophy of scientific management. The devices employed to give effect to these principles constitute the mechanism.

Aims, plans, policies and methods as they concern productive processes. As I analyze it, there are three principal aims in it: (1) seeking of more precise information through investigation, experiment, etc.; (2) as great an amount of prediction of what is going to happen in business operation as is possible on the basis of the unusual amount of exact information acquired; (3) precise control of the processes of conducting the business by various functionalized people

in such wise as to bring about as precisely as possible the predictions which have been made on the basis of the exact information required.

1. Seeking of more precise information. It is in the scientific-management plant that investigation and experiment—the establishing of an experiment room with adequate equipment under the direction of capable investigators—have been worked out. It is in connection with this investigation and experimentation that time study has come in. I cite it as a method of acquiring precise information. Time study simply means a method of acquiring exact information with respect to the time which it takes a person to do a certain thing, with certain definite equipment, under certain definite conditions.

2. Precise prediction. If one by time study and other investigation has secured and filed information telling the time of performing a unit operation with certain tools and materials under certain conditions, then if an order comes in to do or make something which represents a combination of these unit operations, by a simple mathematical calculation it is possible to determine how long it will take to fill the order, what materials and tools must be provided, what conditions established, when work on each part should begin, when and how they should be assembled, etc. In other words, an accurate layout of work on the job becomes possible. In most plants layout is by guess. Guess involves waste. An accurate layout of separate jobs means accurate layout and dovetailing of all jobs, and economical and efficient operation of materials, equipment and labor; in other words, more precise control.

3. Precise control. This means that to each of a number of persons shall be assigned, with authority, the responsibility of maintaining one or more of the standard conditions on the basis of which the prediction or layout of a job is made. The principal standard conditions to be maintained are:

a) Standard materials.

b) Standard storing and issuing of materials.

c) Standard conditions under which work is performed.

d) Standard methods of performing operations.

Through what machinery are the three primary aims of scientific

management (investigation, prediction, precise control) accomplished? This machinery is described in the words *functional organization.*

See also "Specialization in Management," page 827.

3. IMPERSONAL LAWS OF MANAGEMENT[34]

In its original conception the Taylor system of scientific management seems to have been literally a system of shop management concerned primarily with the problem of efficient manufacture or productive efficiency in the shop. As time passed, however, the character, scope, and significance of scientific management seem to have steadily enlarged in the minds of Mr. Taylor, his immediate followers, and his imitators, so that when the term "scientific management" was definitely adopted by adherents of Mr. Taylor as descriptive of his system, the intent, apparently, was to emphasize claims for it much broader and more fundamental than those originally made—claims which seem to warrant the following summarization:

1. Efficiency, not only in the mechanical aspects and as it depends on organic arrangements and human effort in the shop, but with respect to the functions of a going industrial establishment, is governed by fundamental natural laws, not made by man, and unalterable by man.

2. Scientific management has discovered the *means* by which the facts underlying these natural laws, which govern production in the larger sense—productive welfare and distribution—can be determined and established as objective, matter-of-fact data, quite apart and divorced from human judgment, opinion, or will; i.e., the means by which all productive arrangements and processes and all the relations between managers or employers and workmen can be reduced to an exact scientific basis of objective fact and law.

"Scientific management," declared Mr. Taylor, "attempts to substitute in the relations between employers and workers the government of fact and law for the rule of force and opinion. It substitutes

[34] Adapted from R. F. Hoxie, "Scientific Management and Labor Welfare," *Journal of Political Economy,* XXIV (1916), 833–44.

exact knowledge for guesswork and seeks to establish a code of natural law equally binding upon employers and workmen." In time and motion study it has discovered and developed an "accurate scientific method by which the great mass of laws governing the easiest and most productive movements of men are investigated. These laws constitute a great code which, for the first time in industry, completely controls the acts of the management as well as those of the workmen."

According to statements made by scientific managers, this process of analysis or time and motion study, in the larger sense, should, where possible, begin with the determination of a site for manufacture. The really scientific manager, starting out *de novo,* will work out, with the utmost care, and with reference to future expansion, the plans for the construction of his plant. This will involve a most careful study of all the general internal arrangements and processes, the most efficient methods of planning the work to be done and of routing it through the shop so that there may be no delay in transmitting orders, no waste carriage of materials and partly finished products, no lost time in the assembly room waiting for delayed parts. With the same ends in view, and in the same manner, he will also determine the most effective placement of machinery, the storage of tools and materials, and the location of the various elements of the office force.

The shop constructed and the machinery installed, he will apply time and motion study in an endless series of experimental tests to determine what possible improvements can be made in machinery and its operation, and in the tools, fixtures, materials, and specific processes of work. The best feed and speed for each machine, with reference to the different grades of materials, will then be established. The different jobs or processes will be analyzed and re-analyzed, and their elements experimentally combined and recombined, the tools and fixtures changed and rearranged, and all these variations timed and retimed in an effort to discover the most efficient productive combinations and methods.

This time and motion study analysis will extend, it is thus claimed, to every feature and all organic relationships of the mechanical process of production. But it will not stop there. It will be extended to cover the managerial functions and the office work. The duties of the managers, superintendents, and especially of the shop foremen, will

be analytically studied and reorganized. As a result, the work of the old managerial functionaries will be split up, and new departments with new department heads established. The methods of storage and delivery of tools and materials, the dispatching of orders from the office to the shop, the purchasing of materials, the marketing of products, and all the methods of accounting will likewise be subjected to time and motion study in this larger sense, with a view to discovering the most efficient means and methods. All this and much more is time and motion study in the larger conception of the term, which seems to be sanctioned by progressive scientific managers.

Nor, under the direction of this really scientific manager, we are told, will this part of the time and motion study correspond to the conception of it held by labor. On the contrary, it will be done in the same spirit and with the same care that we have noted above. It will endeavor to discover by repeated analysis and experimental timing the best character, combination, and arrangement of tools, materials, machinery, and workmen, the most efficient and convenient lighting, heating, and seating arrangements for the workmen, the proper period for continuous operation by them, considering the element of fatigue, the rest periods needed, their most efficient character, combination, and sequence of motions, etc. Moreover, these particular job experiments will not be confined to one man, or to a few of those who are to accomplish the task. Many men will be timed with the idea of discovering, not the fastest speed of the fastest man, but the normal speed which the group can *continuously* maintain. If necessary, hundreds and perhaps thousands of time and motion studies will be made to determine this, before the task is set and the rate established. And whenever a new or better method or combination has been discovered by the time and motion analysis, which is supposed to continue even after the task is set, the whole process of careful and extended timing for task-setting will be repeated, and new tasks and rates established reasonably conformable to the new condition.

Finally, as an integral part of this broader time and motion study, all the results secured by it will be continuously and systematically filed as permanent assets and guides to future action.

Thus conceived, time and motion study appears to be considered a method of analysis applicable to practically every feature of the

productive and distributive process, considered apart from its purely financial aspects, a process of analysis applied continuously throughout the life of the establishment. And the scientific management based upon it is conceived to be a perpetual attempt to discover and put into operation the new and continuously developing technical, organic, and human arrangements, methods, and relationships constantly revealed by it to be more efficient and more equitable.

F. The Place of Management Today

We are so close to the operations of the current economic order that we cannot be sure that our vision possesses perspective. Under such circumstances it is unsafe to dogmatize. But it is entirely permissible to inquire whether perchance the rising importance of management is indicative of a striking change in the organization of the economic order. There has been a time when the craftsman was the dominating figure in society. He was succeeded by the capitalist. Is management beginning to occupy the center of the stage? If it is, what does this mean to the economic order?

Of one thing we may be certain: we have entered upon an era of business management in which the best business leadership (*a*) emphasizes scientific knowledge, (*b*) accepts the need of formal training for management, (*c*) stresses the significance of human relationships, and (*d*) avows as the ultimate justification of business, service to society. All this constitutes what may properly be called a new era in business management.

The selections in this section throw light upon the following[34a] issues:

1. In what respects is the administration of business more complex today than in earlier economic orders? In what respects have the executives of today new responsibilities?
2. Is management coming to hold a more strategic position in the economic order?
3. What generalizations seem safe to make with respect to the past, the present, and the future of our industrial leadership?

[34a] A more detailed statement of issues may be found in *Outlines of the Economic Order*, pp. 181–86. (The University of Chicago Press.)

1. SOME COMPLEXITIES OF MODERN BUSINESS

It has become the fashion to refer to industry prior to the industrial revolution, particularly that of the fourteenth and fifteenth centuries, as simple industry, whereas the industry of today is termed complex. Let us see precisely what is involved in this antithesis.

The outstanding features of industry of the fourteenth and fifteenth centuries were these: It was small-scale industry; both worker and master, even those of limited intelligence, could survey and understand the processes involved. Markets were of small scale, with respect both to space area and to time area, and simple commercial organization would suffice. It was tool industry, so that the technique involved was simple and understandable. The social structure was relatively simple. Industrial control was primarily local, and society lacked its modern interdependence. A man of but ordinary intelligence and training could appreciate with some accuracy his relationship to the rest of organized society. It was industry where the total costs were almost entirely direct costs, so that the master could know, and would know without the necessity of a complex accounting system, his costs of operation. It was industry where the initial capital outlay involved was exceedingly small.

Very different things are true of our modern complex industry. It is large-scale industry, so that practically no one in a great organization can know the details of all the processes involved. The market area, both time and space, is tremendous and the commercial organization of society correspondingly intricate, complex, and difficult to understand. It is machine industry as opposed to tool industry with all that this involves in intricacy of processes, in difficulty of the determination of costs, and in the complexities of social control. It is a complex interdependent society, so that even the most intelligent master has difficulty in fully appreciating his relationship to the rest of society. It is an industry where a large part of the total cost is made up of supplementary cost, so that pressure is brought upon the manager to retain his present volume of business and to develop new business under conditions where competition is no longer satisfactory as the law of trade; and finally, it is industry where large initial capital outlay is required.

Some of the consequences of the transition from simple to complex industry may be put as follows:

1. Capital is not as mobile as in the mediaeval period. The railroad industry furnishes an extreme illustration of this fact. This industry is pre-eminently an industry of much fixed, specialized capital. Tracks, locomotives, cars, etc., require tremendous outlay, and when these instruments have been called into being they can be used only for the one purpose. Social capital has been committed to the enterprise in a way that is irrevocable. In both the railway and in other businesses not merely fixed capital but the expensive and intricate organization, both industrial and commercial, make changes difficult unless one is willing to incur heavy costs. Under the régime of simple industry, processes were simple and little capital was required for any new business venture. If the venture proved unsuccessful, the enterpriser could shift fairly readily to some other line of activity. His loss of capital in the old enterprise would not be great nor would his capital requirements in the new enterprise be unduly large. It is self-evident that a very different situation obtains in complex industry.

2. In complex industry a large part of the costs of operation is without any very definite relation to the volume of the business transacted. This being true, it is not difficult to understand why the railroad manager who will develop new business is eagerly sought after; nor is it difficult to see the justification of building branch lines which are not in themselves profitable, but which bring in a little more traffic for a long haul on the parent line. From the manager's point of view, it is clear that he should give low rates on cheap and bulky commodities in order to induce them to move and thus increase the volume of his business. Thus the significance of the principle of "charging what the traffic will bear" is apparent, as is also the interest of the public in reduced rates as business develops. Failure to reduce rates under such circumstances might mean excessive profits for a public utility.

3. This is perhaps only another way of saying that under complex industry the relation between total cost of production and the price of the product may be neither clear nor definite. Total cost in machine industry may be divided into two parts: (*a*) those costs specifically incurred for a given unit of business and which are vari-

ously known as prime costs, direct costs, or variable costs; (*b*) those costs which are largely independent of the volume of the business and which have been called supplementary costs, indirect costs, overhead costs, or constant costs. The preceding paragraph showed that it pays to get business at a price which is below total cost, provided that price is above prime cost. In addition to this situation, there are plenty of cases where it will be wise for the manager of a complex industry to continue his business even though the price received for his product does not suffice to cover even the prime cost. For example, it has been asserted that a certain railroad has throughout its history hauled coal at less than prime cost because the railroad believed that this was the policy it must follow in order to develop manufacturing industries along its lines, and thus secure the traffic and profits involved in the hauling of manufactured goods. Another example may be found in the case of a manufacturer who believes that by a short war he may drive one or more of his competitors out of the field, and who accordingly cuts his price below even prime cost. Of course this cannot be expected to continue as a permanent policy. Another and a somewhat more subtle case is to be found when the price is to be cut below prime cost in order to develop added business of the same type. The logic of this situation lies in the fact that the increased volume of business may result in a different proportioning of the prime and supplementary costs through the introduction of special facilities for handling this new business. The consequence is that the price which was formerly below prime cost is now higher than prime cost because the prime cost (per unit) has fallen.

4. It is difficult for the manager to have complete knowledge of the factors involved. On the organization (both commercial and industrial) sides of his work, this is readily seen. The pressure for added business generally brings about a steady increase in the scale of operations so that personal supervision and control are no longer sufficient. Impersonal devices must be called to the rescue.

Of these impersonal devices, accounting, and especially cost-accounting, stands out prominently. Cost-accounting in simple industry would not be a difficult matter. It would involve no intricate computations. In complex industry, however, the cost-accountant must grapple with both direct and indirect costs. He must find meth-

ods of distributing the indirect costs over the units produced. If this is well done, it will be of great value, not merely with respect to finding what costs *have been,* but also with respect to determining what costs *ought to be.*

Mr. F. M. Simons has outlined the functions of cost-accounting carried on within a plant as follows:

1. The records provide for following the material from the raw state until it is finished product and showing the actual costs of every act, direct or indirect, in the productive process.
2. A system of reports sets forth this information in such a way as to be available for one or more of the following uses:
   a) The records account for all expenditures.
   b) The records enable technical men to make comparisons which may lead to scientific or technical progress.
   c) The records furnish data which guide the company in its policies and methods with respect to
      (1) Estimating and bidding in other work.
      (2) Price-fixing.
      (3) Selecting best line to make.
      (4) Making up new lines.
      (5) Deciding whether to make or buy.
   d) The records make possible the development of more complete executive control by
      (1) Comparison of actual costs with ideal standards.
      (2) Discovery and explanation of wastes.
      (3) Checking up performance of standards in use.
   e) The records make possible the comparison of different periods of production to show the significance of
      (1) Internal changes which have been made.
      (2) External changes beyond the control of the company but bearing on the future of the industry.

5. Competition is not a satisfactory "law of trade" in complex industry, and the incentives to combination are exceedingly strong. The railroad industry again gives an excellent illustration:

If once a rate war breaks out there seems to be no stopping-place. The field cannot be abandoned, for the instrument can produce nothing but transportation, and a large part of the charges (e.g., interest on bonds) would accumulate even if not a train moved. If traffic falls off, costs will not fall proportionately. It follows, then, that a manager may go on for long periods "producing transportation" and col-

lecting a rate which does not cover his total cost per unit, provided the rate covers added cost per unit or more. As has been seen, he *may* produce at less than added cost per unit. In addition, since the costs are largely joint costs, it may be impossible to know definitely until after it is all over just where the line between "paying" and "losing" business is (a situation particularly true in the earlier days of our railroads). It is not surprising that we have "cutthroat competition" under such circumstances.

Competition does not necessarily mean the "survival of the fittest" in this industry. A bankrupt road, which has been repudiating some of its fixed charges and which is willing to skimp its maintenance for years; or a round-about road, subsisting largely on local traffic and hauling the added through traffic at a ridiculously low rate, may be more than a match for the solvent, direct route—as witness the differentials, many of which are allowed "weaker" roads to induce them to stop fighting the "stronger" ones. The ancient assumption that competition was a proper "law of trade," whatever that may mean, was based upon the assumption of a "normal" in which competitive forces had worked themselves into a state of equilibrium. Up to the present time machine industry has developed so rapidly that a "normal" has never been attained. The railway of today differs from that of 1830 as much as the early railway differed from the turnpike. On both the mechanical and the business sides, industry has undergone through constant development what has amounted to almost a revolution every few decades. As a consequence, the competitive equilibrium has been and seems likely to be of little significance in complex industry.

6. Problems connected with the social control of industrial affairs are very complex and baffling in machine industry. It is not merely that we "do not know." We do not know that we do not know. Our measures of control are largely based upon the hypotheses of simple industry. Through social inheritance the popular mind has been firmly established in the dogma of the infallibility of competition under any and all circumstances, so that our formal social control is organized on the assumption that price should correspond with cost and that this will come about when the "normal" has been worked out.

The situation is far from hopeless, however. We are doing much

to improve our knowledge of the essential facts of the case, and here both technical schools and cost-accounting are rendering and will continue to render good service. Then, too, we are gradually coming to a popular realization of the shortcomings of "free" competition as the law of trade in complex industry, and are coming to rely more and more upon formal social control in the guise of state action laying down the rules of the game under which our industrial operations must be performed. And we are making increasing use of informal social control. We are striving to develop codes of ethics and to bring home to the individual a sense of personal responsibility.

See also:
"Incentive in Modern Industry," page 667.
"Concentration in Modern Business," page 857.
"Social Significance of the Integration of Industry," page 890.

2. THE NEW INDUSTRIAL LEADERSHIP[35]

If we consider the industrial history of the United States, for the span of a long generation, dating backward from this year of grace to about 1840, we can distinguish at least three great movements which have occupied the minds of men in industry.

The first period was still engaged in the process of settling the country, as previous decades had been. In section after section of the newly opened West there was required that basic equipment which is the foundation of modern civilized life. Our nation's first industrial task was the stupendous one of clearing the farms, and of building the common roads, and of establishing villages and cities, and of opening outlets for the marketing of surplus products. The victory was not to mere parsimony and patience, and the weaker economic virtues, but to industry animated with boldness, planning touched with imagination, and sacrifice sustained by a vision of a new State and a fairer civilization.

The second industrial movement of the period we are considering centered upon the task of providing an adequate mechanical equipment. Its characteristic achievement was to develop inanimate

[35] Adapted by permission from E. D. Jones, *The Business Administrator,* pp. 1–21. (The Engineering Magazine Co., 1914.)

sources of power, and apply them in a thousand new ways to lift the burden of physical toil from human shoulders. Accordingly, the second act transfers the scene of chief significance from the field to the factory. The first billet of Bessemer steel was produced in America in a little furnace at Wyandotte, near Detroit, in 1864. The first band-saw was brought from Paris to New York in 1869. The first middlings purifier essential to the modern milling process was built in Minneapolis in 1870. The twine-binder was invented in 1874. In the wonderful Centennial year of 1876, there was given to the country the telephone, the incandescent light, the typewriter, and the first steel-frame building. In the middle years of the seventies the hermetical sealing and the refrigeration of fruits and meats was achieved, so that a great additional range was possible for the dietary of the nation.

And now that these achievements are no longer in their origins, and that the issues called up by them are recognized as virtually settled, and as there is no longer any threatening opposition to try men's souls in the process of establishing and defending them, a third industrial problem can be seen to emerge and become the center of interest. This is the question of business administration.

This administrative phase of our industrial evolution has, of course, already a history of value; and this history is concerned with the doings of a very interesting generation of men. For years the United States, with its enormous domestic market, its ample capital, its freedom from tradition, and its colossal daring, has been perhaps the most favorable spot in the world for trying out new ideas of organization and management. The executives who first took advantage of these conditions were, for the most part, self-made men. We often refer to the more noted of them as Captains of Industry. The majority were individuals of pronounced motor temperament and endowed with exceptional talents; men capable of fighting their way upward and of gaining the advantage in a rough-and-ready struggle for the survival of the fittest.

These men seized leadership by right of ability, but, technically speaking, they secured it as the perquisite or privilege arising from the ownership of great fortunes. They lived in a day when men gen-

erally managed their own capital. In many cases they were the first to build up institutions of great size in the lines of industry with which they were connected. Their policies were like those of most conquerors—direct, simple, and intensely personal. Living in a highly individualistic and self-confident society, they worked out rules of action, each man for himself. As the attention of a new community naturally centers strongly upon the process of growth, many of them were builders rather than administrators; more comfortable with tests of excellence which were physical rather than intellectual, private rather than social. As their communities had broken sharply with European traditions, and had as yet little applicable history of their own, they entertained a poor opinion of lessons drawn from the past. As they were devoted to little else than industry, they saw few analogies between the administration of business affairs and the administration of other forms of social action.

Being so much in a world of their own creation, they looked upon the administration of industrial enterprises purely as a process of each man minding his own business. Their organizations were, therefore, mere extensions of themselves, usually bearing their names and ruled as their households might be. Enterprises so conceived were incapable of serving as a rallying-point for the loyalty of the various classes of persons who might become connected with them. The owner alone was fully energized. He carried staggering loads of responsibility, driving affairs forward by individual energy rather than by the true administrative process of evoking and guiding the energies of others.

Whatever reservations have to be made in praise, the courage and independence of these men must be recognized as splendid. They possessed a thorough mastery of details, as a result of the small beginnings from which they started. They had the ease and speed of decision due to technical mastery and early imposed responsibility. They were preserved from errors of theory by a wholesome and intimate sense of reality. The names of the leaders of this generation of giants will long remain household words in America.

Since the ranks of the first generation of administrators have begun to be seriously thinned by death, a notable change has been taking place in the character of our industrial leadership, and in the

conditions under which it is exercised. The growth of business into units embracing, under a single administration, hundreds and even thousands of stockholders and employees and uniting many minds in operations which require long periods of time for their completion, call for searching tests of performance, and exact and just methods of apportioning rewards, so that the wills of many persons can be brought into energetic concurrence. These changes are transforming the business administrator from a mere owner of private property into a responsible agent, exercising delegated authority. They increase the element of trust or responsibility or service, for the measurement and valuation of which a new outfit of standards is urgently needed.

There are various helps destined to play an increasing rôle as the handmaids of the new administration. In the first place, the physical sciences are being applied in industrial operations in a new way. Formerly thought of as the source of mechanism for supplementing or relieving the operative, they are now the source of agencies for supplementing and relieving the executive as well. They assist in the testing of materials, the refining of productive processes, the preservation of the operatives' health, the sharpening of technical standards, the separate measurement of the essential elements of performance, and the provision of new forces and instrumentalities generally.

A second class of aids includes greatly improved systems of accounting and cost accounting, and a rapidly developing theory of valuation, which concerns itself with the more subtle and immaterial forms of property. These are the administrator's chief instruments of precision, where problems of value rather than problems of physical processes or of human nature are concerned.

A third aid is the swiftly forming science of psychology which now enters, supplementing experience, dissolving the ancient antagonism between humanity and efficiency, and making it possible for industry to respond intelligently, and even profitably, to the demands of a more enlightened public conscience.

A fourth aid is what is commonly called "system": a somewhat indefinite mass of rules of procedure, together with appropriate equipments, relating particularly to office work, and representing the accumulated experience of innumerable official minds.

The first tentative synthesis of these various *Hülfswissenschaften*

into a code of rules for the business executive is involved in the movement known as "scientific management." This manifestation of a new order of accurate and systematic thinking in industry, so significant of the times, took its rise as a philosophy of the shop, but has culminated in the enunciation of a group of principles constituting an encouraging earnest of a forthcoming more fully developed science of administration.

The occupant of this position will be the central pivot upon which a vast number of human relationships will turn. Upon these men will rest a sort of trusteeship to preserve the property intrusted to them, and a demand of leadership to guide and guard their employees. Upon them will also rest a general responsibility to the public to help this day to live its life, and this generation to make its contribution to progress. The whole situation conspires to create an opportunity for a new race of executives, which shall justly appreciate the various classes of responsibility resting upon it.

The old ambition to build up big business units, and to accumulate great fortunes, is now no longer so fresh and full of zest as it once was. It does not get the response, and call out the best men, as in the old dramatic, careless, buccaneering days. To simply repeat what the last generation did in the way of piling up fortunes, and to do it on the same intellectual and aesthetic and ethical plane, but without the novelty of being the first to do it, nor the excuse that first comes bread and then the higher things of life, and without even the freedom of action and the general applause of the days of *laissez faire,* is not to set forth a very moving aim. The hungry intelligence of industry is asking for great new objectives worthy of great efforts. It asks for tasks as noble for us now as the opening of the continent or the building of the railroads was for a past generation. A new and larger conception of the function of industrial leadership is called for.

See also:

"The Engineering Profession," page 356.

"Calculation and Measurement through Statistics and Accounting," page 362.

"Some Significant Standards, Their Meanings and Purposes," page 365.

"A General View of Modern Technology," page 480.

"Formula for an Efficient Workman," page 593.

"Organization and Functions of a Personnel Department," page 681.

"An Analytical View of Administration," page 760.

"Some Aids to Administration," page 767.

"The Comptroller Function," page 777.

"Impersonal Laws of Management," page 803.

CHAPTER VII

SOME SIGNIFICANT DEVELOPMENTS OF MODERN PRODUCTION

Purposes of this chapter:

1. To take up for special consideration the extensive specialization and intricate interdependence of modern production.
2. To examine the factors making for and against large-scale operations and to see the relationship between large-scale operations and monopoly.
3. To note recent trends in production and in productivity.

Our discussion of production has served to show us that it is an economic "struggle" to gratify wants; has indicated the nature of the utilities secured or created in the process; has treated the factors conditioning production—intangible attitudes and institutions as well as tangible factors—all being today profoundly under the influence of science and technology.

We are now ready to examine a few of the more striking manifestations or developments resulting from our peculiar methods of production. As has so often been the case we must content ourselves with an examination of a few significant samples; we cannot study the whole field in detail, and we must postpone to the final chapter of Part III certain matters of evaluation of the present economic order.

At this time three large issues may be taken up with profit.

The first issue has to do with specialized character—and hence the interdependence—of the modern order. What are the advantages and disadvantages of specialization? What factors condition the extent to which it may appropriately be carried? What types of interdependence follow from this specialization and what are its consequences?

The second issue has to do with the scale of operations and the

concentration of control in our major economic activities. The chief types or forms of large-scale operations; the fields of activity to which large-scale operations are appropriate; the extent of the concentration of control and its many forms; some of the major proposals for remedial action in cases in which remedial action seems indicated—these are the matters to be examined in this connection.

Third, we shall examine the outstanding facts with respect to the increasing productivity of the economic order, giving particular attention to the situation in recent years and the causes of that situation.

A. Specialization and Interdependence

In our discussion of the present-day individual-exchange-co-operative-pecuniary society we have assumed both the existence and the defensibility of specialization and interdependence. This was permissible. They are familiar concepts—commonplaces. It frequently happens, however, that the significance of commonplaces is overlooked and these particular commonplaces are so pregnant with consequences that they must not be passed by without some detailed explanation.

In considering the topic specialization, care must be given to terminology. Some writers use the expression "division of labor," as synonymous with "specialization." Others use "division of labor" with particular reference to the apportionment of tasks within the industrial plant. Still others use the phrase in no single definite sense. In this introductory statement, specialization will be used as the inclusive term and such phrases as "separation of occupations," "division of labor" (within a given plant), and "territorial or geographical specialization" will be regarded as subclassifications of the general heading. In no event should confusion of terminology prevent our seeing that capital, land, and organization are as truly "divided" or "specialized" as is labor.

What is a specialized society? It has two significant aspects. The first is *differentiation,* but differentiation would be purposeless and barren of results were there not also present *unification.*

It is the presence of *differentiation* or *morcellement* in specialization which justifies Clay's statement that "specialization is fundamental in economic organization because it is a means by which man increases the return to a given amount of work." There can be no

question concerning the significance of any device which will increase the return to a given amount of effort—which will multiply man's effectiveness. But precisely why (and to what extent) does *morcellement* do this? The answer is that it enables us to take advantage of certain physiological, psychological, and physical laws. It increases man's effectiveness because it enables him to use these laws in such a way as to give him more effective command of his powers and nature's powers.

Morcellement is a technical matter. How far it is possible to carry *morcellement* depends upon the physical character of the task and upon the extent of the existing knowledge (whether rule-of-thumb knowledge or scientific knowledge) with respect to the technical issues concerned. This is axiomatic, for to break down a task or activity into its parts is to analyze its technique.

It may or may not be wise to carry this differentiation as far as it is possible to carry it. For example, in that form of specialization called division of labor, there is reason to believe that some tasks have had the *morcellement* carried so far that monotonous, repeated performance has led to serious physiological and psychological consequences and has resulted in social loss, considering only the effective utilization of social resources in the task of producing goods, and not counting the other "human values." Then, too, it may not be wise to carry *morcellement* as far as it is possible to carry it in cases in which there is very little work to be done. The cost of carrying out the *morcellement* may not be justified since there is so little opportunity to use it.

Probably in most types of economic specialization the element which in practice sets the limit to which it is wise to go in the *morcellement* is the need of co-ordinating the differentiated activities. No matter how technically efficient the differentiation may be (in an earlier paragraph we have seen why it is efficient), there is no economic virtue in carrying it beyond the point at which poor co-ordination more than offsets the technical gains of *morcellement*. This statement leads us to consider how co-ordination is brought about. In some cases effective co-ordination depends upon the technique of administration; this is notably true within a factory, a store, an office, or other operating unit. In other cases effective co-ordination depends

upon action by some governmental authority; this is obvious when a government co-ordinates its differentiated activities in time of war. In still other cases co-ordination is brought about through the market, the specialists exchanging their products with one another.

To sum up: How far *morcellement* can be carried is a technical issue which is partly a physical matter and partly related to the existing state of knowledge. It can undoubtedly be carried far, especially in all forms of specialization that involve the use of tool-technique. How far *morcellement* may wisely be carried depends (1) upon the costs involved in differentiation compared with the practical use which can be made of it, and especially (2) upon the effectiveness of the available co-ordinating devices.

Of course, specialization is not a device for getting something for nothing. Man pays a price for the increased productivity of specialization. We shall need to understand not only why specialization is an asset but also why and wherein it costs. With both sides of the matter before us we can reach a judgment concerning the value of specialization in the economic order. Analysis of both the advantages and disadvantages of specialization will be faciliated by thinking of specialization in terms of its separate types rather than as a vague undifferentiated whole.

A keen observer of our living together has remarked that we have not sufficiently reflected upon the fact that a specialized society is by that very fact an interdependent society, and that our particular form of specialized society is one in which internal strains can rather readily come into being and can rather readily enlarge and spread. Unless the specialized parts of the society are kept in good balance a strain is certain to arise, and if a strain does arise the interdependent character of society causes this strain to spread to other parts of society. Indeed, a small strain in one part may set up a larger strain in a dependent part.

Obviously, interdependence is an important aspect of the organization and operation of our economic order. Does our interdependence grow with the growth of specialization? If so, wherein does this mean advantages and wherein disadvantages in social living? In so far as disadvantages and dangers exist, what courses of action may we widely adopt?

The selections in this section may appropriately be studied with these issues[1] in mind:

1. What is the extent of specialization today and what are its main forms?
2. What are the advantages and disadvantages (and to precisely whom?) of the main types of specialization?
3. What factors condition the extent to which specialization is utilized?
4. What types of interdependence are most significant in our society?
5. What corollaries or consequences attend the fact that our society is interdependent?

1. SPECIALIZATION AND CO-OPERATION[1a]

In our general account of the co-operation prevailing under the present order, no attempt was made to go into the matter at all specifically. In fact it was vaguely assumed that all co-operation takes a form wherein each producer makes some one thing from first to last—starts it and finishes it ready for the consumer, e.g., the farmer supplying potatoes. This sort of co-operation we might distinguish as primary co-operation or primary *division of occupation.* But everyone knows that co-operation commonly goes much farther than this. Almost no one carries from the beginning to the end the processes necessary to the production of a particular consumption good. The work of the baker must be preceded by that of the miller and the farmer. So, the work of the shoemaker must be preceded by that of the tanner and the stock farmer. Further, between each producer in the series and his successor, must come the dealer, the middleman, to effect the necessary transfer of the product between the independent producers. In addition, the various members in the original series make much use of the products and services of producers in other series. Thus, the dealers who transfer the hides from the stock farmer to the tanner make use of the services of various producers outside the series, especially those engaged in the transportation business. Tanners again use

[1] A more detailed statement of issues may be found in *Outlines of the Economic Order,* pp. 193–203. (The University of Chicago Press.)

[1a] Taken by permission from F. M. Taylor, *Principles of Economics,* pp. 21–23. (University of Michigan, 1916.)

coal produced by another group, also bark, and various chemicals. In like manner, shoemakers use thread, bristles, needles, machinery, cloth, etc., etc., which they obtain from other classes of producers quite outside our original series. Here then we have division of occupation within division of occupation. We might call it secondary co-operation or secondary division of occupation.

But, in an economic society having any considerable degree of development, co-operation and specialization go still farther than has yet been brought out. Even in the last case we were thinking of *undivided industrial units,* though each was devoted to providing only some one element in the ultimate product; e.g., a stock farm devoted to raising cattle, a tannery occupied in preparing hides for leather and so on. But we all know that there is specialization *within* each industrial unit. The tannery, which as a whole produces leather, has some men scraping hides, some attending to the curing of the hides in the various baths, some staining, some finishing, some keeping books, some writing letters, etc. Obviously this sort of specialization is also of very great significance. Writers have sometimes distinguished it from the kinds already considered as *division of labor,* while those are called division of occupation.

But we have not yet brought out the full extent of co-operation and specialization under the present order. The specialization thus far considered more especially grows out of the differences in the physical or technical operations to be performed, as just seen in the case of tanning. But there are deeper differences among the functions, processes, factors, involved in production. Production requires that some man possessing more or less wealth should assume the *responsibility* of production; it requires that he should have *land* upon which to work; it requires that he should have *laborers* to perform the different tasks; it requires that he should have *materials, tools,* and *machines* to assist these men. In short, to use the more technical language of economics there must be at least *three* factors of production: *land, labor* and *capital.* As the last of these comes to the work in two different relations, controlled by two different sets of persons, we have in reality something like *four* groups of productive agents engaged in every industry, namely: *landlords, laborers, capitalists* proper, those who supply the capital needed in production, and *entrepreneurs,* those

owners of wealth who assume the responsibility of production. Here, manifestly, we have a deeper sort of co-operation and specialization than anything yet considered. This particular kind of co-operation and specialization now under consideration, I will for the lack of a better term designate as *functional co-operation.* We at least ought to realize the existence of such a system, even if we seldom have occasion to make special reference to it.

The student should further note that the development of this functional specialization and co-operation brings in its train new cases of specialization analogous to the simpler forms already considered. Thus, the more completely the furnishing of capital has become isolated from taking the responsibility of production, the more there have developed institutions for dealing in this capital. Prominent among such institutions are commercial banks, savings banks, trust companies, and so on.

To summarize this discussion: The present economic system presents itself to us as one wherein we have a vast complex of different industries, mining, stock-raising, farming, manufacturing, transporting, etc., each concerned in the production, of some commodity at one or another stage of completion, while, within each of these industries, different functional groups of productive agents, entrepreneurs, capitalists, laborers, and landlords are co-operating, and while, finally, *this vast industrial complex is brought together, is held together, and is regulated through exchange*—buying and selling.

See also:
"Plato's Sketch of an Industrial State," page 34.
"Individual Exchange Co-operation," page 37.

2. TYPES OR FORMS OF SPECIALIZATION

A. SPECIALIZATION IN CAPITAL[2]

Certain fundamental principles characterize American methods of manufacture; such as the employment of special machines to perform specific operations only, whereby the output of a factory is enormous-

[2] Taken by permission from A. E. Outerbridge, Jr., "Specialization in Manufacture," *Annals of the American Academy of Political and Social Science,* XXV (1905), 47–48. (Philadelphia, Pa.)

ly increased, minute and systematized division of labor effected, the costly work of finishing and adjusting minimized, and the highest development of skill, accuracy, and dispatch acquired. The high wages paid to skilled labor in this country have acted as a stimulus to the invention and perfecting of labor-saving machinery, and the employment of such labor-saving machinery operated by high-priced, intelligent mechanics has resulted sometimes in a very much larger output and lower cost of product per man employed than anywhere in the world under old conditions. These features have perhaps received most notable development in the fine art of watchmaking by machinery in America, wherein the acme of perfection and economy is shown.

The system of concentration of labor in large factories for making watches in this country is the antithesis of the method of scattered manufacturing which prevailed for centuries in Europe, notably in Switzerland. M. Favre-Peret, who investigated this industry in the New England States some years ago, stated that the average production of 40,000 workmen in Switzerland was 40 watches each per annum, while in America the average was 150 fine watches for each man employed.

By the aid of special machines in these watch factories one man can make 1,200 fine screws per day, some of which are so small that more than 100,000 are required to weigh a pound. One of the finest pieces made is a "pallet-arbor" or pivotal bolt, which, for a small-sized watch, has a thread of 260 to the inch, weighs 1/130,000 of a pound, undergoes 25 operations, and costs but 2¼ cents. Measurements are gauged to 1/25,000 of an inch.

The balance wheel, after being machined, weighs only 7 grains, and when fitted with 16 gold screws weighs 7.2 grains; there are 80 separate operations upon a balance wheel, 66 of them being drilling, threading, and countersinking holes; the drills revolve at a speed of 4,800 turns a minute and one operator can drill upwards of 2,200 holes for the balance wheels per day.

B. LABOR SPECIALIZATION[3]

The division of labor grew with the industry, following the introduction of the refrigerator car and the marketing of dressed beef, in

[3] Taken by permission from J. R. Commons, "Labor Conditions in Meat Packing," *Quarterly Journal of Economics*, XIX (1904–5), 6–7.

the decade of the seventies. Before the market was widened by these revolutionizing inventions, the killing gangs were small, since only the local demands were supplied. But, when the number of cattle to be killed each day increased to a thousand or more, an increasing gang or crew of men was put together; and the best men were kept at the most exacting work. At what point the greatest economy is reached was discovered by experiment and by comparison of one house with another. Each firm has accurate knowledge of the labor force and the output of every other house, and in this way each improvement becomes general and each superintendent is keyed up. Taking a crew of 230 butchers, helpers, and laborers, handling 1,050 cattle a day under the union regulations of output, the time required for each bullock is equivalent to 131 minutes for one man, from the pen to the cooler, the hide cellar, and all the other departments to which the animal is distributed. But this is made up of 6.4 minutes for the 50-cent man, 1¼ minutes for the 45-cent man, and so on; and the average wage per hour for the gang would not exceed 21 cents, making the entire labor cost about 46 cents per bullock.

Three main objects were gained by this division of labor. *First,* cheaper men—unskilled and immigrant labor—could be utilized in large numbers. *Second,* skilled men became more highly expert in the quality of their work. While, on the one hand, this greatly increased the proportion of low wage men, it also pushed up the wages of the very few skilled men on the delicate and particular parts of the work. An all-round butcher might expect to earn 35 cents an hour, but the highly specialized floorman or splitter earns 50 cents an hour. Some of these expert floormen work a week at a time without cutting a single hide, so deft and delicate becomes their handling of the knife. If the company makes a few of these particular jobs desirable to the men and attaches them to its service it can become independent of the hundreds who work at the jobs where they can do but little damage; and their low wage brings down the average to 21 cents, where, if all were all-round butchers, the average would be 35 cents. Consequently, in the course of time the companies put a few of the strongest men, and those with a particular knack for their work, on "steady time," paying them a salary of $24 to $27 a week, regardless of time actually worked; but the other nine-tenths of the gang were hired by the hour,

and paid only for the time at work. These steady-time men not only stood by the company, but acted as pace-setters; and in this way a *third* object of division of labor was brought about—namely, speed.

See also:
"Census Classification of Occupations," page 274.
"The Transfer of Thought, Skill, and Intelligence," page 555.
"The Wage-Earning Class," page 577.
"Occupations in Manufacturing," page 587.

C. SPECIALIZATION IN MANAGEMENT[4]

Let us go over the duties which [an old-fashioned] foreman in charge, say, of lathes, or planes, is called upon to perform, and note the knowledge and qualities which they call for.

First. He must be a good machinist—and this alone calls for years of special training, and limits the choice to a comparatively small class of men.

Second. He must be able to read drawings readily, and have efficient imagination to see the work in its finished state clearly before him. This calls for at least a certain amount of brains and education.

Third. He must plan ahead and see that the right jugs, clamps, and appliances, as well as proper cutting-tools are on hand, and are used to set the work correctly in the machine and cut the metal at the right speed and feed. This calls for the ability to concentrate the mind upon a multitude of small details and to take pains with little, uninteresting things.

Fourth. He must see that each man keeps his machine clean and in good order. This calls for the example of a man who is naturally neat and orderly himself.

Fifth. He must see that each man turns out work of the proper quality. This calls for the conservative judgment and the honesty which are the qualities of a good inspector.

Sixth. He must see that the men under him work steadily and fast. To accomplish this he should himself be a hustler, a man of energy,

[4] Taken by permission from F. W. Taylor, *Shop Management*, pp. 96–98, and *The Principles of Scientific Management*, pp. 123–25. (Harper & Bros. Copyright by author, 1911.)

ready to pitch in and infuse life into his men by working faster than they do, and this quality is rarely combined with the painstaking care, the neatness, and the conservative judgment demanded as the third, fourth, and fifth requirements of a gang boss.

Seventh. He must constantly look ahead over the whole field of work and see that the parts go to the machines in their proper sequence and that the right job gets to each machine.

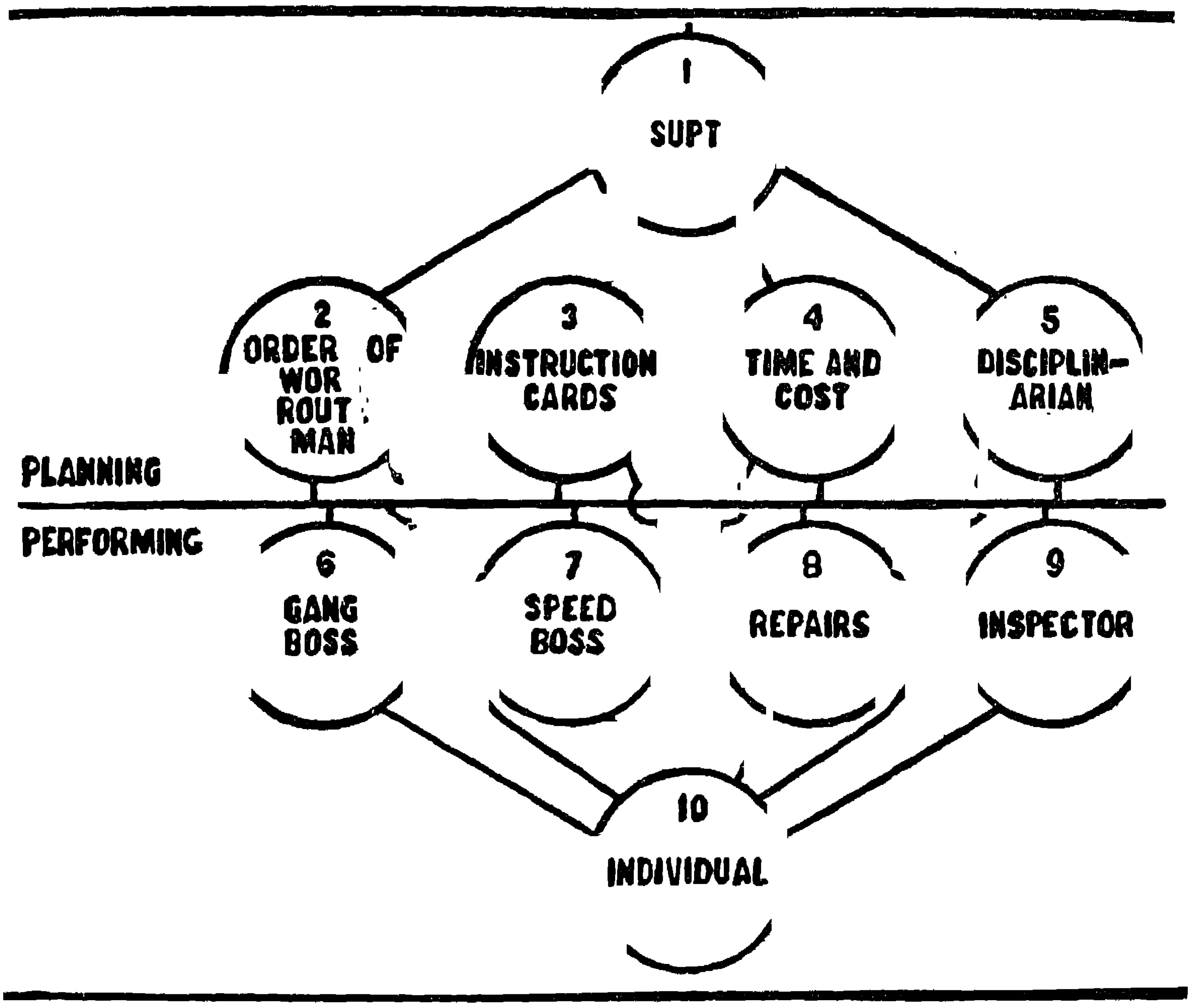


Diagram Illustrating the Principle of Functional or Scientific Management

Eighth. He must, at least in a general way, supervise the time-keeping and fix piecework rates. Both the seventh and eighth duties call for a certain amount of clerical work and ability, and this class of work is almost always repugnant to the man suited to active executive work, and difficult for him to do; and the rate-fixing alone requires the whole time and careful study of a man especially suited to its minute detail.

Ninth. He must discipline the men under him, and readjust their wages; and those duties call for judgment, tact, and judicial fairness.

Under functional management, the old-fashioned single foreman

is superseded by eight different men, each of whom has his own special duties, and these men, acting as the agents for the planning department, are the expert teachers, who are at all times in the shop helping and directing the working. Being each one chosen for his knowledge and personal skill in his specialty, they are able not only to tell the workman what he should do, but in case of necessity they do the work themselves in the presence of the workman, so as to show him not only the best but also the quickest methods.

One of these teachers (called the inspector) sees to it that he understands the drawings and instructions for doing the work. He teaches him how to do work of the right quality; how to make it fine and exact where it should be fine, and rough and quick where accuracy is not required—the one being just as important for success as the other. The second teacher (the gang boss) shows him how to set up the job in his machine, and teaches him to make all of his personal motions in the quickest and best way. The third (the speed boss) sees that the machine is run at the best speed and that the proper tool is used in the particular way which will enable the machine to finish its product in the shortest possible time. In addition to the assistance given by these teachers, the workman receives orders and help from four other men: from the "repair boss" as to the adjustment, cleanliness, and general care of his machine, belting, etc.; from the "time clerk," as to everything relating to his pay and to proper written reports and returns; from the "route clerk," as to the order in which he does his work and as to the movement of the work from one part of the shop to another; and, in case a workman gets into any trouble with any of his various bosses, the "disciplinarian" interviews him.

See also:
"Principles and Devices of Scientific Management," page 800.
"Impersonal Laws of Management," page 803.

D. GEOGRAPHICAL SPECIALIZATION[5]

First in importance in fixing the home of certain industries is the presence of natural deposits or supplies. This determines imperiously the location of mines, quarries, oil or gas wells, fisheries, lumber and

[5] Adapted by permission from E. A. Ross, "The Location of Industries," *Quarterly Journal of Economics*, X, (1895–96), 247–68.

fur industries, and the collecting of nitrates, borax, sponges, pearls, buffalo horns. Thus the Chilian desert is the site of nitrate mines, the oyster industry haunts the Chesapeake, dye-woods are furnished from tropical forests, while the sulphur pits of Sicily supply brimstone to all parts of the world.

Besides the simple finding, digging up, breaking off, cutting down, dislodging, capturing, or bringing together of natural substances or growths, we often find these reduced, refined, prepared, preserved, or otherwise worked up before leaving their original locality. Here we may, in thought, distinguish two industries, one working on raw materials supplied by the other. Many elaborative processes are in this way attached to some extractive industry, and located with reference to it. The weaving of basket ware established itself in Franconia, owing to the splendid growth of willow-trees in the neighboring valley of the Main. Most of the slate pencils of the world are made in the Thuringian forest, the site of the finest slate quarries.

Probably next in importance is nearness to the sources of raw or auxiliary materials. This consideration will have most influence first, when the materials are bulky and heavy relatively to their value; second, when the finished product embodies but a small part of the materials employed or contains much greater value; third, when transportation facilities are backward, or the materials are produced in a mountainous district or in the interior of a country where the cost of transportation is unusual. These conditions are met with in the metal industries, so that ore is for the most part smelted near the mine, if fuel be forthcoming. The sawmills, in turn invade the wilderness or follow up logging streams in quest of their material. While there is no great shrinkage in sawing logs into lumber, the greater ease of handling is sufficient to carry the sawmill to the logs instead of the logs to the sawmill.

Here we bring in a new consideration—the fact that extractive and elaborative industries are linked together by technical as well as economic bonds. The perishability of the materials makes the location of the dependent industry in many cases something more than a matter of freight bills. Neither cane nor raw juice can be carried far without spoiling, for a similar reason salmon canneries will cling to the banks of the Columbia, while fruit and vegetable canneries will

stick close to Maryland orchards and California ranches. This tether that binds one industry to a certain spot, despite the economic attractions of other localities, is weakened by every new device to preserve form and stay decay. So far, the frozen meat cargoes and refrigerator fruit shipments are in the service of the consumer rather than of dependent industries; but we may yet see these industries set free to obey other forces of location.

Whenever great heat is needed, it is impossible to ignore the sources of fuel supply. This, therefore, is of great importance in locating the metallurgical, chemical, and refining industries, the smelting, casting, rolling, or forging of iron or steel, the manufacture of brick, hardware, glass, stoneware, pottery, and porcelain.

When coal is burned simply to develop steam power, its cost of carriage is not so great as to make nearness to source of fuel a prime desideratum in location. Its rival, water power, on the other hand, has not been portable in any form, and, if used at all, has to be used in strict connection with the falling water that generates it. Around eligible water power, therefore, settle industries employing heavy machinery such as flour mills, planing mills, sawmills, and many manufactures of wood and metal.

A power site thus becomes the core of an industrial center. Lowell, Lawrence, Fall River, Concord, and other manufacturing towns on the streams tumbling from the granite hills of New England owe their rise to this cause. The South owes part of its growth to the falls in its rivers. Great milling centers, like Rochester, Niagara, and Minneapolis, are the result of cheap power. It is likely that, with the advent of the economical transmission of electrical energy to a distance from the place of generation, the value of the more eligible power sites will be enormously increased; while, on the other hand, the concentrating tendency being checked, the milling industries will be left free to follow other attractions.

Climate is not only decisive for vegetal products, but appears to play no small rôle in locating manufactures. Partly to the fact that a very moist atmosphere is necessary in order to spin the finer cotton yarns is due the steady concentration of the cotton industry in Lancashire, where high hills inland keep off the dry east wind, and precipitate a copious downfall from the sea winds from the west.

The residence of the consumer frequently determines the location of the industry. The whole groups of service industries of course follow the consumer. In fact, the chief economic difference between goods and services lies in the fact that the place of production of the latter is in relation to the consumer. Besides this, certain industries that produce goods such as tailoring, millinery, photography, and pharmacy, must refer to the person of the consumer. Repair work settles near him. Confectioneries, bakeries, and market gardens must be near to him to avoid deterioration of product. Daily newspapers are published where the readers dwell, in order to secure promptitude. The bulk and waste of artificial ice in transportation, as well as the bulk of coopers' products, compel them to be made where wanted.

If raw materials, fuel, and power are necessary to production, no less are labor and specialized capital. The capital required for buildings and machinery is, however, rarely influential in locating an industry, because the buildings are locally supplied, while machinery, if brought from elsewhere, is transported once for all, and cannot therefore compete with material or fuel as a factor in location. Capital, the most mobile and dynamic factor of production seeks its allies instead of requiring them to come to it. It effaces itself in the location of industries, consulting always the local affinities of the other productive factors.

Labor is not sharply localized, as is natural power, for instance. Like fuel or materials, it can be transported; and, like them, its prices in different markets perpetually tend to converge. But the transplantation of the laborer entails the expense of transportation of himself, family, and belongings, and all the costs in trouble, risks, and sentiment that attend a change of residence. While the elaborative industries performing the first operations on nature's products are the most regardful of nearness to materials, fuel, and power, the higher branches that fabricate finished goods are apt to attend more carefully to labor cost. In the manufacture of clothing, linen, underwear, gloves, boots and shoes, millinery, cigars, patent medicine and cutlery, the cost of labor enjoys the controlling position. Apart, therefore, from the cost of moving materials or product, industries will tend to congregate in commercial centers, in order to profit by the cheapness of labor that

results from a cost of living kept low by easy resort to a wide supplying area.

Many items enter into the articles of union between labor and capital besides the matter of remuneration. Cash wages, prompt payment, notice of discharge, liability of employer, provision of fire-escapes, fencing of machinery, limited hours for women and children —all these obligations, whether imposed by law or by labor organizations, will, if unattended by heightened efficiency, be unfavorable to capital and may lead to its migration. So, too, industrial disturbances, rioting, frequent and prolonged strikes, dispose capital to exodus if a more tranquil seat can be found.

3. INTERNATIONAL SPECIALIZATION AND FREE TRADE[6]

It has not been possible to get thus far in our discussion of economic principles without bringing out by implication one of the principal reasons why economists as a class are free traders—they favor the utmost possible freedom from restrictions, because this means the largest possible amount of co-operation—it enables everyone to benefit most completely by the productive activity of everyone else. But, whatever economists think, governments continue to try to guide our trade into more or less artificial channels. In doing this, they profess to act on the basis of principles. We have no intention of undertaking here a study of these principles. But one or two of them belong to our present topic in that they concern directly the question—When is exchange-co-operation, trade, between different countries profitable? To this question, therefore, we must now give a little attention.

One general condition under which exchange-co-operation would surely be profitable would be realized if two communities, C_1 and C_2, produced just two things, P_1 and P_2, and C_1 could produce P_1 much more cheaply than could C_2, while C_2 could produce P_2 much more cheaply than could C_1. Evidently both would gain if C_1 should produce enough P_1 for both, and C_2 enough P_2 for both. On the basis of this case, we might say that exchange will usually pay if each of the exchanging countries can produce some particular thing much more cheaply than the other.

[6] Adapted by permission from F. M. Taylor, *Principles of Economics*, pp. 73–77. (University of Michigan, 1916.)

But, while the most important cases of exchange-co-operation between countries would probably be covered by such a principle, fuller analysis long ago showed that this statement does not cover all cases, is in fact misleading. If we stopped at this, the reader might very naturally conclude that trade would pay only when the condition just explained was present. He might even conclude that we ought never to buy a thing from other countries if we could produce that thing as cheaply as those other countries. This notion, though quite wrong, is quite common. The unsoundness of the doctrine as applied to the case of an individual is at once evident. Here, for example, is a lawyer who very likely can mow his lawn, cultivate his garden, and take care of his furnace much better than the person or persons whom he hires to do these things. But what he does is to devote himself to the practice of his profession, and buy the services named from other people; and of course he acts wisely in doing so. So long as he can find a market for his possible output, he would better devote his time entirely to doing the thing for which he is pre-eminently fitted, and get his supplies of other things from his neighbors, even though he can make those other things better than his neighbors.

Now, it seems pretty evident that the case of a community or nation is in this respect no different from that of an individual. The Upper Peninsula of Michigan produces little but copper and iron, getting most other goods through exchange with other communities. Yet it would be easy to prove that Upper Michigan is really better fitted to produce some of these things which she buys from the rest of us than we are, and that her people are quite aware of this. The explanation of this situation is to be found in what has been long known as the Law of Comparative Cost.

Ignoring cost of transportation, two communities (persons) find it profitable to specialize respectively in the production of two commodities and to exchange those commodities each for the other provided the comparative real costs of the two commodities in one community are different from their comparative real cost in the other community.

Illustration: Letting labor represent all real costs, suppose that

in England the cost of a ton of iron is 25 days' labor and the cost of a yard of broadcloth is 5 days' labor; while in America the cost of the iron is 16 days' labor and that of the broadcloth 4 days' labor.

Eng. cost Iron : Eng. cost Cloth :: 25 : 5
Am. cost Iron : Am. cost Cloth :: 16 : 4

The comparative costs are not equal; therefore, by the principle, specialization and exchange will pay.

Argument: Since in England a ton of iron costs five times as much as a yard of cloth, it will naturally tend to be worth the same as five yards of cloth; under which conditions England can afford to give iron for cloth if, and only if, she can get more than five yards per ton; or trade cloth for iron if, and only if, she can get it with less than five yards per ton. In America, on the other hand, a ton of iron tends to be worth four yards of cloth; under which conditions America can afford to trade iron for cloth if, and only if, she can get more than four yards per ton; or to trade cloth for iron if, and only if, she can get it with less than four yards. But the first hypothesis for England and the second for America are plainly shut out. England cannot get more than five yards of cloth for iron, since in America it is worth only four yards. So America cannot buy iron with less than four yards of cloth since it is worth five yards in England. On the other hand, the second hypothesis for England and the first for America fit each other perfectly. England can get iron for less than five yards, since it is worth only four in America; and America can sell iron for more than four yards of cloth, since it is worth five in England. Accordingly, under the conditions supposed, an exchange of English cloth for American iron would be profitable.

The foregoing statement of the Principle of Comparative Cost puts it in terms of the reciprocal trade of two countries. But in fact most international trade is not of this twofold character. It is triangular or multiangular. Nation A sells to B; B sells to C; and C sells to A. At bottom, however, the cases are substantially alike. The condition which makes specialization and exchange profitable is a difference between the comparative costs to one country of the things exchanged and their comparative costs to other countries.

4. ADVANTAGES OF SPECIALIZATION[7]

1. The first of the advantages of division of labour is that it enables man to make the best use of the various qualities possessed by different parts of the surface of the earth. If each man worked entirely by himself, he would be obliged to get everything from a very small area.

We must not think only of the impossibility of obtaining certain products from certain areas. There is a great deal more than that to be considered. There are many degrees of difficulty short of the infinite degree which is literal impossibility. We get coffee from Brazil, tea from Ceylon, and bananas from Teneriffe or Jamaica, not because it is absolutely impossible to grow these things in England, but because it is much more difficult to grow them here where the soil and climate are not so suitable.

2. The second great advantage of division of labour is that it enables labour to be so distributed between different persons that their original or natural qualities may be best utilised.

Obviously it will be better to divide the whole of the work to be done between all the workers concerned in such a way that the work requiring great strength is given to the strong, work requiring dexterity of mind to the clever, and so on, as far as possible. The proviso "as far as possible" is necessary because, just as it is not true to say everything must be done in the place best fitted for it, so it is not true to say everything must be done by the person best fitted for it. Often the person best fitted for one kind of work will also be the best fitted for another kind of work or for several other kinds: he must then be allotted the labour which it is best he should perform when the special capabilities of all the workers, including himself, are taken into consideration. Some of the work will then necessarily be allotted, not to the person best fitted for it, but to the second, third, fourth, and fifth best fitted.

In practice this advantage of division of labour is inextricably mixed up with the third, to which we now proceed.

3. The third advantage of division of labour lies in the fact that it enables much greater skill and dexterity of hand and brain to be ac-

[7] Adapted by permission from Edwin Cannan, *Wealth*, pp. 41–51. (P. S. King & Son, Ltd., 1914.)

quired for each of the various occupations. "Jack of all trades" is proverbially "master of none." A person who had to supply all his own needs would have to do so many things that he could not expect practice to make him perfect at any of them. When different kinds of labour are allotted to different persons, so that the whole or greater part of the working time of each is given to one, or at any rate a few kinds of labour, each acquires in a high degree that special dexterity required for his particular work which is obtained by practice. Furthermore, it becomes possible to give to each person the perhaps more important kind of skill and dexterity which is to be obtained by education or deliberate training. Human life is far too short to make it worth while to give individuals the elaborate training necessary for more than one of the more difficult employments.

This advantage is necessarily mixed up with the second, because when once particular qualities have been acquired, it does not matter whether they have been acquired by training and practice or are the result of "original" or "natural" characteristics.

4. The fourth advantage of division of labour is that it greatly facilitates the acquisition and retention of the sum of knowledge which is transmissible from one generation to another. This is quite distinct from the advantage of skill and dexterity just discussed. Skill and dexterity enable people to use known processes themselves. Without division of labour the inventions and discoveries which have made modern man's power over the forces of nature so much greater than that of his remote ancestors could not have been made, because no man would have had time to specialize sufficiently in the particular lines of study required. When the knowledge has been once acquired, it would often be lost if it were not for the existence of books and instruments which could not be produced without division of labour. In other cases the retention of the knowledge in the world is only effected by means of the exertions of a class of educators, which, again, could not exist in the absence of the division of labour.

5. The fifth advantage of division of labour is that it economises tools and machinery of all kinds, including the buildings in which work is carried on. By this we mean that it makes a given amount of machinery "go farther," or be more effective, and so makes it advantageous to mankind to provide itself with machinery which would

otherwise be too costly. Everyone has experienced difficulties from the want of appropriate tools when he has attempted quite simple jobs outside his own trade or profession. "Jack of all trades" is not only unskillful, but also ill-provided with tools. Evidently if everyone had to do all kinds of work it would have to be done for the most part with very much less effective tools and machinery than at present. As things are, these things can be liberally provided, even when costly, because the division of labour allows them to be kept in continuous use, which would be impossible if anyone had a complete equipment of each.

5. DISADVANTAGES OF SPECIALIZATION

A. DEGRADATION OF INDIVIDUALITY AND PROVINCIALISM[8]

Society, we have admitted, properly requires its individual members to specialize—that is, devote a considerable amount of their time and energy to serving society by the performance of certain routine work which shall contribute to the social support. Modern methods of mechanical production and of business organization favour a continual advance of this specialization, and have brought about certain notable changes in its character and its reaction upon those who undergo its influence. So long as the specialization needed to contribute to social service meant that each person should ply some particular trade or profession, should apply himself exclusively to the production of some single class of commodities as farmer, tailor, doctor, under conditions which required considerable variety of skill and experience, and evoked a corresponding interest in the work, so long as the range of specialism at least allowed each man to see the end and the utility of the work he did, no net injury to individuality was wrought. But where machinery of ever nicer character is brought more and more into play, and where the arrangement of large businesses and the increased specialism of small businesses, proceeding apace over the industrial world, brings about an ever finer subdivision of labour, for the express purpose of rendering such labour as far as possible unskilled and purely mechanical, in order that a larger quantity of routine products may be turned out by each worker in a given time, such

[8] Adapted by permission from J. A. Hobson, *The Social Problem,* pp. 226–30. (James Pott & Co., 1901.)

specialization has distinctly degrading effects upon the life and character of the workers. Enlightened teachers of humanity—such as Carlyle, Emerson, Ruskin, Tolstoy—have uttered vain protests against the degradation of individual life and character by this narrowing and monotonizing of all labour on the one hand, and the grossly materialistic conception of civilization involved in measuring prosperity by quantity of mechanically wrought goods on the other hand. No one acquainted widely with the facts of industry can seriously question the statement that the conditions of much modern work tend to crush out all human interest in it. A man can get no pleasure from his work when it imposes a constant strain upon the same muscles and nerves, and can be most easily done so far as the actions become automatic; when the tedium of constantly repeating the same narrow movements compels the cultivation of indifference; when strict confinement to a single process hides from him the true purpose and utility of his work, and he cannot claim any single whole commodity as the product of his labour. By such methods the economic "cost of production" of commodities is reduced to a minimum, but the real human cost is continually enhanced. That cost consists in the degradation of the individuality of the worker, primarily as workers, but secondarily as consumer, by the oppression of society.

These dangers of over-specialization, due to a defective order of society which subordinates the interests of the producer to the supposed interests of the consumer, are not confined to individuals, but beset the life of larger units of society. Nations are specializing more and more, some confining themselves to growing corn or cotton, sugar or tobacco, others to particular departments of manufacture. England is devoting herself to textile and metal manufactures, shipbuilding, and certain branches of commerce; within England large districts are monotonized by exclusive devotion to pottery or iron; town life is becoming more strongly differentiated from the country, the town itself divided into residential and business quarters, while these again are split by endless subdivision. These are but the wider social aspects of an excessive division of labour, which reaches its culmination in the machine-tender of the most highly organized modern factory—a man whose working life is incomparably narrower in scope and more vacant of human interest than that of any living creature in the past.

Local specialization exaggerates the ill effects of over-specialism upon the individual worker by furnishing a material environment which offers no relief. To have one's life bounded by a horizon of "black country" or "potteries," "cotton" or "coal," the land and labour of which are alike devoted to a single industry, implies not merely a daily dullness and monotony of outward life, but an absence of all wholesome stimuli to the development of the intellectual and moral tastes which make for the progress of national life and character. Cheap railway trips, cheap print, and external machinery of education are ineffective to counteract the degrading provincialism of these specialized industrial areas of which modern countries are more and more composed.

B. UNFORTUNATE RESULTS ON EMPLOYMENT[9]

The division of labor, and the accompanying development of machinery, give inducement to the employment of classes that should not be employed at steady and monotonous labor. Small children and persons failing in health are drawn into the circle of sustained labor. The former should be allowed to develop their faculties in a natural way; the latter to recover their health. When each employment required all the faculties of a normal man, there was nothing to tempt producers to employ laborers of this class. Since the introduction of division of labor, the evil of employing those who should not be employed has assumed serious proportions. Legislation has been invoked to limit the employment of children, but in few countries has child labor been subjected to wholly satisfactory regulation.

A further disadvantage of division of labor is that it renders the workman dependent on a certain kind of work, and therefore exposes him to the risk of non-employment when supplies of material are wanting or when markets fail. There are in most modern countries many men and women who are well-trained textile workers, but who do not know how to find employment when a crisis causes a contraction of the textile industry. The higher the degree of specialization the more serious are the effects of changes in industrial conditions.

[9] Taken by permission from A. S. Johnson, *Introduction to Economics*, pp. 117–18. (D. C. Heath & Co., 1909.)

See also:
"The Worker under the Domestic System," page 198.
"The Transfer of Thought, Skill, and Intelligence," page 555.
"The Machine and the Laborer," page 562.
"Unemployment," page 611.

C. STRAIN AND MONOTONY[10]

Besides the physical strain due to speed and complexity of machinery, health is injured by the extreme monotony of many branches of industry. Specialization has been carried so far that change and variety of work are reduced to a minimum. Minute division of labor results in the constant repetition of similar motions and processes by the same worker, favoring the onset of fatigue and requiring for relief the establishment of a shorter workday.

Monotony of occupation is a true factor in inducing fatigue, because it has a true physiological basis, which can briefly be made clear. We know that with repetition and sameness of use there results continuous fatigue of the muscle or organ used. So, too, with the nerve centers from which our motive power springs. We must bear in mind that the special functions of the brain have separate centers. Thus, there is a center for hearing, another for sight, another for speech, etc. When certain centers are working continuously, monotonously, from morning to night, day by day and week by week, it is physiologically inevitable that they should tire more easily than when work is sufficiently varied to call upon other centers in turn.

The monotony of so-called light and easy work may thus be more damaging to the organism than heavier work which gives some chance for variety, some outlet for our innate revolt against unrelieved repetitions. Monotony often inflicts more injury than greater muscle exertion just because it requires continuous recurring work from nerve centers, fatigue of which reacts with such disastrous consequences upon our total life and health.

See also "The New Strain in Industry," page 560.

[10] Adapted by permission from Josephine Goldmark, *Fatigue and Efficiency*, Part I, pp. 67–68; Part II, pp. 42–44. (Charities Publication Committee, 1912.)

6. THE LIMITS OF SPECIALIZATION

A. LIMITS SET BY THE COMMERCIAL AND ECONOMIC ORGANIZATION[11]

So long as differentiation of functions rests upon a direct exchange of services, it cannot be carried far. Population would need to be fairly dense before a man could devote himself exclusively to the building of houses, even if he undertook the work of stone mason, brick mason, and plasterer in addition to that of carpenter. Such trades as that of locksmith could hardly exist at all, since a scattered rural population could scarcely furnish work enough to maintain it. An important step in the direction of economic specialization was taken when men began to produce commodities for sale.

Differentiation of functon in production is in large measure dependent upon the character of the existing commercial organization. In the field of production at the order of the consumer, division of labor is dependent largely upon the density of population. Where the producer of a commodity deals directly with the consumer, the opportunity for minute division of labor is not so great as where the producer is brought into relation with the consumer through the intermediation of a general market. The amount of work that may be secured by a single custom-tailor's shop is limited by the number of purchases of custom-made garments within easy distance. In a village this number may be so small that anything like subdivision of the tailor's trade is impracticable. In a large city the case is different.

The degree in which the functions of production may be subdivided is dependent upon the prevailing form of economic organization. Where each workman is his own employer, as was generally the case in the mediaeval industrial organization, labor cannot be very minutely subdivided. Where, on the other hand, industry is carried on under the factory system, the workmen are assembled under one roof, subject to the control of an employer. The material passes through the shop without interruption, and apprentices are taken on in each branch in the proportion which experience shows to be most desirable. Of course this implies a large accumulation of wealth on the part of the employer, who must provide the premises, furnish materials, pay wages, and assume all other expenses of production. In

[11] Adapted by permission from A. S. Johnson, *Introduction to Economics*, pp. 107–13. (D. C. Heath & Co., 1909.)

fact, we may say that large capital and efficient management are prerequisites to a thoroughgoing system of division of labor.

B. LIMITS SET BY THE NATURE OF THE WORK[12]

The division of labor is also limited, in many cases, by the nature of the employment. Agriculture, for example, is not susceptible of so great a division of occupations as many branches of manufactures, because its different operations cannot possibly be simultaneous. One man cannot be always ploughing, another sowing, and another reaping. A workman who practiced only one agricultural operation would be idle eleven months of the year. The same person may perform them all in succession, and have, in almost every climate, a considerable amount of unoccupied time. To execute a great agricultural improvement it is often necessary that many laborers should work together; but in general, except the few whose business is superintendence, they all work in the same manner.

C. MECHANICAL LIMITS[13]

Whilst it is quite evident that there must exist definite commercial and mechanical conditions beyond the limits of which specialisation will cease to be profitable, it is not easy to define these limits in so many words on account of the extreme complexity of the question. Moreover, specialisation being essentially a process of evolution, it is not at all certain that its tendencies can be controlled, or that its developments will always be on the side of even-handed progress.

The mechanical limits of specialisation in any given product will evidently have been reached when no further standardisation of parts can be attained without sacrifice of technical efficiency, and when all the machines in use are special machines each producing one article, and one only, more cheaply and satisfactorily than it could otherwise be produced. The critical point is the determination, for any given piece, when it will pay to devote a machine wholly to its manufacture when such machine will have to stand idle for part of its time. The problem of adopting a machine that can be filled with work is an easy

[12] Taken by permission from John Stuart Mill, *Principles of Political Economy,* I, 175. (D. Appleton & Co., 1893.)

[13] Taken by permission from J. S. Lewis, "The Mechanical and Commercial Limits of Specialization," *Engineering Magazine,* XX (1900–1901), 709–12.

one to adjudicate upon; to know just when to employ a machine that must perforce lie fallow for more or less doubtful periods demands a fine judgment.

The commercial considerations limiting specialisation are much more numerous and important than the mechanical.

7. SOME ILLUSTRATIONS OF THE INTERDEPENDENCE OF A SPECIALIZED SOCIETY

A. THE BONDS OF HARMONY AND OF REPULSION AMONG TRADES[14]

a) The closest relations of common interest will evidently exist between trades which draw upon some single source of supply of raw materials or productive power.

All trades whose chief material is wool or leather, or timber or steel, pulling at some common supply, must look closely after one another; anything which increases or reduces the common supply affects them all alike, so far as there is community of interest; anything which gives one of them a better pull upon the supply than the others affects these latter injuriously, so far as there is diversity of interest. The same evidently holds where a number of local manufactures are dependent for coal or other source of power upon the same supply.

b) Trades that are complementary or subsidiary to one another in some direct way are, as we have seen, in closest harmony. The coal and iron trades are the largest, most obvious instance, but every art of production of course throws a number of trades into similar dependency on one another. Whenever a number of materials must be put together to make a commodity, such direct community of interest is established among the trades that handle each material. Such are the relations between the fruit-growing and the sugar-refining trades, between the wine-growing and the bottle-making trades, between the numerous trades which go to feed with materials the building trade.

c) Where two sorts of material or two sets of processes are alternatives for production, a keen antagonism exists between them. Here we first come across the relation known as substitution, which plays so important a part in industrial progress.

[14] Taken by permission from J. A. Hobson, *The Industrial System,* pp. 28–31 (Longmans, Green, & Co., 1900), and *The Science of Wealth,* p. 41 (Henry Holt & Co., 1911).

Bedsteads are made of wood or steel, so are many other articles of furniture or fittings; sugar may be made from cane or beet; cotton, linen, wool, are alternatives for many kinds of dress or other fabrics; electricity, gas, oil, steam, are competing against one another as sources of industrial, locomotive, or domestic energy.

But as the law of substitution opens out, we get glimpses of a wider, more general sympathy and opposition between trades. The productive energy of man, directly operative through labour, indirectly through capital, is within certain limits free to choose among all the various channels of industry: they are all open to him as alternative occupations. So there is a more universal sympathy and opposition between all trades than any yet named, due to the fact that they draw the very breath of life from common sources. Fresh streams of capital and labour continually enter industry to maintain, invigorate, and enlarge its structure and its vital energy. In its first emergence, as productive energy available for use, this fresh supply of capital and of labour power, the new crop of young labourers and of new savings, is, in a "free" country, at liberty to apply itself to any special sort of industry, and all trades must draw for their needs upon this common and constant supply. They have, therefore, a supreme common interest in the size, quality, and reliability of this supply, and in the terms upon which it is procurable.

But trades are connected, not only through common interests in processes of production, but through changes in methods of consumption. The "standard of comfort" of different classes is constantly changing: every rise or fall of wages alters the proportion of working-class incomes spent on different commodities, and so directly stimulates or depresses groups of trades; the great change from the rural to city life has revolutionised the expenditure of large masses of our population; new articles of consumption, or the cheapening of old articles which brings them in reach of poorer classes, create or stimulate new tastes which not merely absorb new increments of income, but displace older articles of consumption. Taste, fashion, and caprice constantly exert a larger influence on the expenditure of larger sections of the public. Every article of a man's consumption is in a sense competing with every other article for a larger share in his expenditure.

Any change in standards of consumption brings other changes by reason of affinity; a man who takes to drink not only spends more on beer, but often more on tobacco, sport, and betting, while a man who gives up beer and stays at home is likely to spend more, not only on tea, but on reading and quiet recreations.

The rapid spread of the taste for cycling which followed the invention of the safety bicycle, besides its direct competitive effect upon the use of riding horses and the carriage trade, had a large number of clearly traced subsidiary effects, reducing the sale of cheap pianos and jewelry, damaging the book trades, altering the nature of clothing trades, stimulating the sale of non-alcoholic drinks, and reviving the country inns. Nor are these influences confined to changes of material consumption. The increased demand for education in England, by its excessive strain upon the intellectual machinery of the nation, not only stimulates the teaching, the printing, and paper-making trades; it causes immense expenditure of English money upon Swiss holidays, and helps to revolutionise the economic structure of that country.

Thus the growth of harmonious and conflicting desires of consumers weaves the closest and most intricate network of relations between all the various productive processes of the industrial world.

As we recognise the fineness of these relations, we come unconsciously to shift the metaphors we use, and to regard industry less as a stream or a machine and more as a live organism with something like a common flow of blood, a common system of nerves, and an organic co-ordination of parts resting upon a complexity of business cells. None of these metaphors is strictly applicable: industry is neither river, machine, nor organism, but there are many points in which the last term gives the most correct impression. If we could follow out far enough the ties between businesses and trades and trade-groups in what we call the industrial world, we should find a sort of common connective tissue running throughout, thinner and coarser in some parts, stouter and finer in others, but binding the whole set of industrial operations so closely together that any touch bestowed at any point may be communicated to the most distant parts.

See also "Production Illustrated by a Commodity," page 286.

B. TWO PERVASIVE AND CONNECTIVE INDUSTRIES[15]

There are two sorts of industry which deserve particular attention as unifying influences, viz., transport and finance. They are not fundamental, like mining and agriculture, but pervasive and connective. Wherever any business is carried on, a constant conveyance of materials to the business, and of finished goods from the business, is involved; every act of buying and selling involves some act of conveyance. The group of trades concerned with such conveyance must, therefore, occupy a place of peculiar prominence in the industrial system. Taken as a whole, they form an apparatus corresponding to the vasomotor system in an animal organism. In one sense, indeed, all physical work is movement of matter, and much of it forms part and parcel of every business operation. But in modern industrial societies transport in its special sense, the conveyance of persons, goods, and intelligence from one place to another, becomes a highly specialised and important work. The railway and the steamship find a place in almost every series of productive processes. They furnished the physical links that give efficiency and continuity to the whole movement. Any stoppage of a great railway or a great shipping service paralyses a whole industrial area; even cutting of telegraph wires confuses and retards the whole working of industry. As industry becomes more complex, materials and labour are drawn from more distant and more numerous places to take part in more delicate and complex processes of co-operation, and the commercial working of the system depends more and more upon rapid and reliable information about their movements. For this reason transport is found in every civilised country to play a larger and more imposing part in industry, absorbing an increasing proportion of capital and labour, and presenting the most critical problems of control.

Equally pervasive and more authoritative in its general control over all modern industry is finance. Under that term we include all business connected with the production, protection, and conveyance of money, or purchasing power, and the creation of and dealing in stocks, shares, and other negotiable securities. We saw that our science is concerned entirely with things that have a marketable value

[15] Taken by permission from J. A. Hobson, *The Science of Wealth*, pp. 37–40. (Henry Holt & Co., 1911.)

and with processes each act of which involves a purchase. So it is obvious that the industries concerned with the production and application of purchasing power are in their influence as critical and as pervasive as the work of physical transport. The familiar saying, "Money makes the world go round," is a popular testimony to the importance attaching to the sort of business enterprises which produce and regulate the supply of financial power. The forces issuing from finance are operative everywhere throughout the industrial order. A great banking crisis paralyses all industrial activities as surely and even more completely than a breakdown in the railway system.

C. DEPENDENCE OF BUSINESS CONDITIONS UPON CROPS[16]

One can easily discern four or five important ways in which general business conditions are likely to be affected by the success or failure of the crops.

1. In the first place, the size of the crops exerts considerable influence over the community's power to purchase other goods. If the season has been successful, the farmer is almost sure to increase his expenditures, and use at least a part of his new earnings. He may build an addition to his house or erect a new barn, or he may purchase a piano or a new buggy or new house furnishings or new clothes for himself and his family. Even if he does not use all of the additions to his income himself, but deposits some of them in the bank, they will none the less help to swell the market for other goods in the hands of other customers of the bank.

2. In the second place, the very solvency of a large part of the agricultural population, and of those connected by business relations with them, depends to a considerable degree upon the outcome of the year's harvest. Whether or not the farmer will be able to repay loans which he has contracted, whether or not he will be able to settle his bills with tradesmen and dealers, and whether or not he can pay for his agricultural machinery and farm improvements, will in many cases be decided by the size of the crop. A failure in agriculture may be propagated into other fields, and bankruptcies among bankers, dealers, and manufacturers may ensue. If the harvest on the other hand is

[16] Adapted by permission from A. P. Andrew, "Influence of Crops upon Business in America," *Quarterly Journal of Economics,* XX (1905–6), 324–29.

good, and can be marketed at profitable prices, the capital of the affiliated creditors will once more be set free and made ready for new activities.

3. In the third place, in a country where agricultural products form an important factor in the foreign commerce, the size of the crops will exert a considerable influence upon the balance of trade and the international movement of gold. The extent of the bank reserves in the great financial centers and the contraction or expansion of general credit may in consequence depend most importantly upon the output of the season's harvests.

4. Again, the size of such crops as are not consumed in the locality of their production is of great significance for the transportation interests. One has only to observe the fluctuations in railway earnings month by month during the course of any normal year to realize how important a factor the harvests are in railway affairs.

5. Finally, the success or failure of certain crops is also of significance for those industries into which the crop enters as a raw material. A failure of the wheat crop will obviously depress the milling industry, and a failure of the cotton crop will curtail the earnings of the cotton factories, not only those in the vicinity of the cotton-growing states, but those in New or old England as well. A failure of the corn crop similarly will diminish the profits of cattle raising, may work injury to the packing interests, and to some extent may affect also the distillers of whiskey.

At the same time there are, needless to say, other factors than the output of our farms which may affect our prosperity, and whose influence may quite outweigh the influence of our harvests.

D. THE SENSITIVENESS OF INDUSTRIAL SOCIETY

Our pecuniarily organized, interdependent society is naturally enough a sensitive society, sensitive both to demand and to shock.

Almost any organization of society would be sensitive in some degree to demand. In a socialistic society, for example, it is to be expected that desires and demands would change from time to time and that the industrial structure would be altered to meet the new situation. How quickly the structure would be altered is another matter. It is not probable that it would be altered as quickly as it is in our

present society. In a society organized on the gain basis bribes (sometimes of tremendous size) are continually awaiting the early comers in any readjustment, and punishments (sometimes of tremendous size) are continually awaiting the laggards. Indeed, desire for gain even causes us to stimulate new demands.

Any interdependent society will be sensitive to shock—this by hypothesis. If the society is interdependent, one section cannot be indifferent to the events occurring in another section. Of course, different societies would be sensitive to shock in varying degrees. In general terms, an interdependent society organized on a pecuniary basis is probably more sensitive to shock than would be a socialistic society. The gain structure transmits the shock at a speed comparable to the speed involved in the reactions of the nervous system. Even more, in our society the shock may very well grow in the process of transmission. The failure of a small business unit may well cause the failure of a larger one, and this of one still larger, and so on more or less indefinitely. It is probable that shock could be more readily confined to a relatively small territory in a socialistic community than is the case today.

In all of the foregoing there is, or should be, no implication of judgment being passed. There are many respects in which it is fortunate and many respects in which it is unfortunate that our society is exceedingly sensitive both to demand and to shock. For our present purpose the essential need is to see that our society is sensitive and to realize that if we desire to retain the gains of a society organized in such a way as to bring about this sensitiveness we must be alert to cope with the disadvantages. This, of course, we are trying to do. A long catalogue might readily be made of our activities in striving to overcome these disadvantages. It is perhaps sufficient to mention in this connection the formation of the federal reserve system in our banking operations.

8. IMPERSONALITY IN A SPECIALIZED SOCIETY[17]

Anyone who moves from a country town to the city is impressed by many contrasts, but perhaps notices more than any other the fact

[17] Adapted from L. M. Powell, "Impersonality of Modern Life," *Lessons in Community and National Life*. Community Leaflet No. 8, pp. 25–32. (Government Printing Office, 1917.)

that in the city he lives his daily life surrounded by people whom he does not know, many of whom he sees but once and then never again. In his home village he knows and calls by name every man, woman, child, and dog he meets, and he meets the same people in every phase of the village life, at church, in the store, at social gatherings, and at town elections. Every event of the lives of the other villagers is of interest if not of real concern to him. Now let us follow him to his city home and look at his city life through his village-wonted eyes. Strangers live in the flat building where he has his home; strangers jostle him in the cars and in the stores where he goes to trade. Strangers manage the plant from which his water supply comes and other strangers keep the electric light plant running. Strangers govern his city, strangers whom he may know by name but not often by sight. He trusts the teaching of his children to strangers; he depends on strangers to take care of him at the hospital if he is ill. He is dependent in a hundred ways upon people whom he never knows, or perhaps meets but once.

He works in a big store or factory where if he stays for years he will never know a dozen of the hundreds of other workers well enough to meet them in any way outside the place of work. If he goes to church he finds there a group of people whom he sees no place else. At his lodge he meets men who do not work with him or go to church with him or vote at the same poll with him. He comes in time to know a hundred times as many people as he knew in his village life but never to know any of them in the complete way in which he knew his village friends.

It is clear enough that the size of a city and the continual change that is going on everywhere within it give very different conditions from those of the tiny placid pool of village life. But in this matter of the extent to which our lives are touched by those of unknown people there is a striking contrast between the modern village, however rural and behind the times it may be, and the village of pioneer days. What article of dress or food or household furnishing now used by village people can be connected by them with the person or persons who made it? Perhaps a few of the housewives are getting country butter, brought to their doors by the farmer's wife who churned and shaped it. Perhaps the village carpenter comes in and puts up a shelf which

he has stained and varnished. But the brackets on which the shelf rests come from nobody knows where, and were taken through all the processes from mining the metal to their final shaping by people whom the villager has never heard of and will never know. So it is with almost everything he uses. His flour comes from an unknown miller's hands, his shoes were made in a distant factory by unknown workers; whether his rugs have come from Persia or Grand Rapids, Michigan, the workers who made them are equally unknown to him. Very different were such matters with the pioneer. He could tell you from what neighbor's farm he had his wood or flax or lumber or leather, and he knew everyone who worked on the processes of making these materials into usable products. His friend the carpenter helped him make his furniture, even the wooden pump for the well; his neighbor the stone mason hewed out stone sinks and troughs for use indoors and out; his wife and family made the cloth for his suits; and the travelling tailor who came regularly to make up the cloth was a well-known and welcome visitor in the household.

What is true in this respect of the modern village is of course true of the city. Indeed the modern system of production is neither for country nor for city but for a "market" wherever that market can be found. Methods of transportation and communication and the use of money have widened indefinitely the distance between producer and consumer. Our system is "a great circle of exchange into which at some point each one of us puts his powers and possessions" and out of which at some other point he draws the powers and possessions of others who are unknown to him. Nor do we in these days produce to meet the needs of people, for we know neither the people nor their needs. We make what will sell for the best price, and if we think at all of human needs it is to reflect that people must need this thing we are making or the price would not be paid. We are working under a system of "anonymous production"—production by unknown persons for unknown persons.

We produce not only for an unknown market but for as large a market as we can get. Where the travelling tailor of early days trusted to get a few new patrons through the friendly recommendations of those he already had, we write a description of what we can do or what we are making and print it in newspapers or magazines, and

hope that everyone who reads it will want to buy our goods. And so we have big factories, big warehouses, big stores—we do things on a large scale. Thus other kinds of human relationships give place to impersonal substitutes. It takes a great deal of money for a big business, and to get this money there has developed a device which we call a corporation, into which a great many people by buying shares of stock can put as much or little money as each one may choose. So that instead of one owner who feels that his business is a part of his personality and takes a close interest in his workmen, his processes, and the quality of his product, we have a thousand or more owners scattered over one or several different countries, who know little or nothing about the business and care about nothing but the dividends they get.

Such is the effect of size, however, that even where we have an individual owner of a large concern he cannot maintain the relations with his workmen possible in a small business. A whole system of organization—managers, heads of departments, foremen, sub-foremen—has come between the "employer" and the "men." When John Goffe of Cornwall, England, was apprenticed to John Gibbs in 1459 to learn the "craft of fishing" it was part of the written contract that "John Gibbs and Agnes his wife should teach, train and inform him in the best way they know, chastising him duly and finding for him food, clothing, linen and woolen, and shoes, sufficiently as befits such an apprentice to be found." The wage system itself as compared with this is impersonal, for it means that the employer need know nothing of his workmen outside the work place. But in the big business there are no personal contacts either in the work place or outside it between the employer and the rapidly shifting crowds of employees. If the employer takes an interest in his workers it must be by groups, and so we have "welfare work," which provides rest-rooms for the women or baseball fields for the men. To the employer of ten thousand workers what can the workers be but pegs placed here and there in a great scheme of organization?

Systematic organization and carefully worked out standards are necessary in modern large scale production not only because of its size but also because of its use of machines. The machines must be set running at a certain time and at a given speed and the workers must adapt themselves to these conditions. What is more impersonal than

a machine? It is impersonal not so much by force of being a piece of senseless metal but rather in that it has assumed the motions and the duties of a human being and is doing the work that human beings once did. Moreover it works in as impersonal a way as the physical laws in accordance with which it is constructed. The law of gravitation and a steam shovel at work are no respecters of persons. Those who work with machines must understand this fact, for upon such understanding rests not only their efficiency as workers but also their safety in life and limb. Good character will not save a man's hand if he puts it under a die press; and though he be in high favor with "the boss" the engine will not get off its track to spare him if he is caught in its way. So the men who work with machines learn to think in terms of cause and effect; that is they learn to think logically, and logic is as impersonal as the machine.

It is not hard to see that certain phases of the impersonality of modern life have brought with them serious problems. In pioneer days when a family prepared food and clothing for itself, it had no motive to make them of any but the best possible quality. When they began to make things for their neighbors the situation was still much the same. The cobbler who made an ill-fitting, ugly pair of shoes for a neighbor would hear about it every day until the shoes were worn out. The village butcher who sold spoiled meat would feel himself a murderer when his neighbors were poisoned by it and died. But nowadays we do not look farther than the price for which we can sell our products because we are thinking not of definite known human beings who will use these products, but of that vague and impersonal thing, a market for our goods.

Modern society is trying to meet such problems as these, and since in the nature of the case anyone may be affected by them and yet no private person can deal with the situation, many of them must be met by governmental devices. So that nowadays we put our trust not in the virtue of the meat packers but in the government inspectors of meat; not in the piety of the man who runs a cannery but in our pure food laws. The government has stepped also into the gap caused by lack of personal relations between employer and worker and tries by labor laws and factory inspectors to keep working conditions safe and decent. The impersonality of machine industry which brings acci-

dents "alike to the just and the unjust" is met by safety regulations and devices and by systems of workmen's compensation. The workers have also developed a device by which they may protect their interests and trade unionism takes care of many of these problems for workers who are so organized. The impersonal situation is met by an impersonal device—collective bargaining, the basic feature of trade unionism, substitutes a group bargain for the old personal bargain between master and man. The employer, on his side, notes that the impersonal situation has taken away certain motives to good and careful work, and devises various systems of inspection and reward to replace those motives. "Scientific management" is an open recognition of the impersonality of our system and an attempt to use it to advantage.

See also:
"Standardization and the Machine Process," page 557.
"Is Man Master or Servant?" page 567.
"The Fears of Labor and of Capital," page 600.
"Incentive in Modern Industry," page 667.
"Guidance of Entrepreneur's Choices," page 750.
"Impersonal Laws of Management," page 803.

B. Scale of Operations and Concentration of Control

Our study of modern industrialism has shown us an individual-exchange-co-operative-pecuniary-specialized-interdepent-technological-speculative society. It has doubtless been evident from the discussion that these adjectives do not so much refer to separate and distinct features of our industrial society as they do to different points of view which may be taken in studying that society. One can almost say that each of these adjectives, taken in its broadest sense, includes all the others.

From another point of view, an outstanding feature of our industrial society is concentration. Large-scale operations have increasingly characterized the society which is emerging from the Industrial Revolution. This term is somewhat vague. Sometimes it means that an individual plant (whether manufacturing, agricultural, or commercial) utilizes a large amount of capital (and perhaps of labor and

land). In certain lines of industry, this tendency is so marked that there has been an actual diminution in the number of separate plants, although there has been a tremendous increase in output. (On the other hand in certain other lines of industry, there is a tendency toward the small scale plant.) Sometimes large-scale operation means that the massing of capital (and perhaps labor and land) has occurred in the form of bringing about a single management of several plants of the same kind, each of which may or may not have reached its own size of maximum efficiency. Some writers refer to this as "horizontal combination." Finally, large-scale operation may refer to what is known as "integration of industry" or "vertical combination," which unites under one management consecutive processes.

What is the size of maximum efficiency in modern business? There is no definite answer. It varies from time to time and from industry to industry. It depends upon the technique of production, upon the market and the arts of administration; and all these factors reach far back into the general social environment.

If one inquires as to how in fact large-scale operations under single control have come to pass, he finds two main ways: (1) In some cases a business that was originally small has prospered, has turned earnings back into expansion, and has finally become a giant industry which may or may not have branches scattered over the country, or indeed over the world. (2) In other cases previously independent businesses have been brought under common control. This is either side-by-side combination or horizontal combination.

If one inquires what manipulative devices (mainly in the realm of the forms of the business unit) are utilized in bringing about the various forms of concentrated control, he finds them to be legion—many of them of curiously subtle character.

In popular discussions of large-scale operation, the trust or industrial combination movement has received an amount of attention quite disproportionate to its importance. The trust movement is, of course, a significant phase of our modern industrial life, and it is clearly a case of concentration of private control of industrial activities. If, however, this monopolistic phase of concentration of control had never taken place, we should nevertheless be justified in giving extended treatment to the concentration of private control of industrial

activities. The occasion for this concentration is found in many of the outstanding features of our industrial system. The devices used in bringing the concentration about may or may not be devices which are also used in trust formation.

The following issues[17a] may well be kept in mind while reading the selections in this section:

1. What generalizations may properly be made with respect to the scale of operations in the modern economic order?
2. What advantages and disadvantages (and precisely to whom?) accrue from the various types of large-scale operations?
3. What are the outstanding instruments or devices used to accomplish concentration of control?
4. What is the relationship, if any, between large-scale operations and monopoly?
5. What are the chief lines along which remedial action may be taken in connection with unfortunate social consequences attending concentration of control?

1. CONCENTRATION IN MODERN BUSINESS

A. GENERAL STATEMENT OF THE CASE[18]

To what extent does a relatively small number of large business enterprises carry on the bulk of the country's business?

Concretely, the problem resolves itself into two questions: (1) How many major business enterprises are there? (2) How much of the total volume of business do they transact?

No complete or reliable answers to these two questions have been available. An investigation, just completed, was therefore undertaken to ascertain the facts.

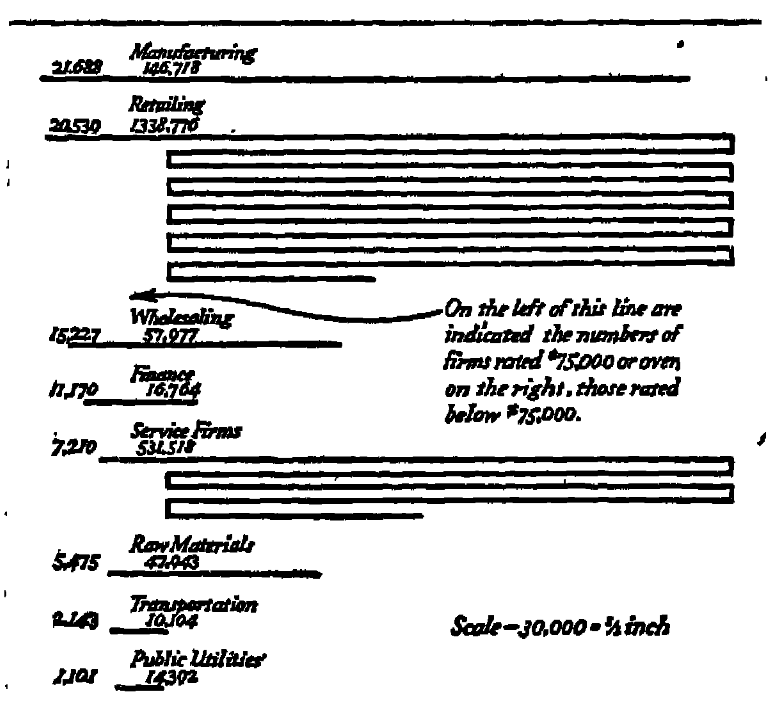
This survey has brought out two striking conclusions—first, that the number of major business concerns is a relatively small proportion of the total number of establishments and, second, that this small number of major firms does an enormously large proportion of the total volume of business.

[17a] A more detailed statement of issues may be found in *Outlines of the Economic Order*, pp. 203–13. (The University of Chicago Press.)

[18] Adapted from Daniel Starch, "Who Does the Country's Business?" *Magazine of Business*, LV (March, 1929), 273, 319–22.

Our study shows that there are in the United States approximately 2,260,400 business enterprises of a reasonably permanent character. These were analyzed and classified according to pecuniary strength in eight classifications: raw material producers; manufacturing enterprises; wholesalers; retailers; public utilities; transportation companies; service firms, including all firms providing primarily a service not covered in any other classification; and financial institutions, including banks, insurance companies, investment houses, security dealers, and trust companies.

Major firms—that relatively small number of large enterprises which carry on the bulk of the country's business—comprise, for the purpose of this survey those concerns rated $75,000 or over, plus such other business organizations as, by virtue of their size or percentage of total business transacted in their respective industries, obviously belong among major concerns.



3.8 Per Cent of Firms Are Major Enterprises

Of the 2,260,400 firms in the country we find, on the basis of their financial strength and the volume of business produced, that but 3.8%, or approximately 85,760, may be considered major enterprises, as we are using the term.

There are, for instance, some 53,418 producers of raw materials (agricultural corporations, lumbering companies, mining and quarrying and petroleum producing enterprises). Of this number, only 10.2% or 5,475 can be considered major enterprises.

In the field of manufacturing there are 168,406 establishments, but only 21,688, or 13%, are rated $75,000 and over. Incidentally, of the 168,406 manufacturing firms, only 3,722 are rated $1,000,000 or over.

There are 73,204 wholesalers, according to our survey, of which 15,277, or 20.8%, can be considered major enterprises.

Of 1,359,315 retailers, but 1.5% (20,539 firms) come under the major classification.

There are 15,493 public utilities; of these 7.1% or approximately

1,100 are among the major enterprises. These could not readily be segregated as to financial strength; but it was found that of the 9,380 telephone companies, some 337 companies do 77% of the business.

There are 4,567 electric companies of which number 150 do 92% of the business.

There are 1,534 gas companies (manufactured and natural), of which number 600 do 90% of the business.

Transportation companies cannot readily be segregated as to rated pecuniary strength. However, of 12,247 transportation companies some 2,143, or 17%, may be considered major enterprises:

There are 1,442 railroad companies; 1,068 do about 90% of the business.

Of 667 electric railway companies, some 300 take care of 85% of the business.

Of 1,120 steamship companies, 35 lines do approximately 70% of the business. Approximately 175 companies own three or more boats.

If you are selling to taxicab companies you will be interested to note that 350 of the 2,250 companies in the business are rated among major companies. Only 414 bus lines out of 6,732 own 10 or more busses each.

There are 538,728 servicing firms, according to our study, and of these only 1.3%, or 7,210, may be considered major enterprises.

Under "finance" we find 29,934 banks and trust companies, of which 11,170, or 40%, have a financial strength sufficiently large to place them among the major financial institutions.

The *Directory of Security Dealers of North America* lists 7,588 firms. Of this number approximately 400 are originating or offering houses or large security dealers which may be listed among the country's major firms.

Casualty, fire, and life insurance companies likewise present an interesting market study. For instance, of 521 casualty companies, 297 do 85% of the business. Of 818 life insurance companies, 224 do 93% of the business.

The chart shows graphically the number of business establishments in each of the eight fields of business and the proportion which

are classified as major enterprises, namely, 3.8%, or 85,766 out of a total of 2,260,400 concerns.

Our second question is, how much of the total volume of business do these 3.8% of concerns transact? Only partial and scattering information was available on this question. It was necessary, therefore, to make a special study.

To answer this question accurately and completely it would be necessary to know the total amount of business done in each of the eight chief fields of business and the amount done by the concerns in each class of financial strength. No figures were available as to the amount of business done by firms in the various classes of financial strength and only partial figures were available as to the total amount of business done in some fields of business.

A special analysis of the financial strength and the volume of business transacted by 1,283 concerns of varying sizes showed that there is a reasonably close relationship between financial strength and gross business transacted. Consequently, if we knew the combined financial strength of all the major firms in each field of business we would have a fairly satisfactory measure of the relative amount of business done by the major concerns.

This method was carried through. The first column in the following table shows the percentage of firms rated $75,000 and over in each line: the second column shows the percentage of the total volume of business in each line transacted by these highly rated firms:

FIRMS RATED $75,000 AND OVER

	Per Cent of Total Number of Firms	Per Cent of Total Business Done by These
Raw Materials	10.2	89
Manufacturing	13.9	93
Wholesaling	20.8	91
Retailing	1.5	59
Public Utilities	7.1	87
Transportation	17.0	90
Service Firms	1.3	81
Finance		
Banks and Trust Companies	40.0	91
Insurance	19.8	89
Investment Houses	5.3	95
Totals (weighted)	3.8	86

These figures are closely corroborated in the two instances in which data from other sources are available, namely the *Census of Manufactures* and the trial *Census of Distribution* in 11 cities. The *Census of Manufactures* for 1925 shows that 10.8% establishments produced 78.6% of the total volume of manufactured products. This compares favorably with 13.0% of concerns producing 93% of the output given in the table.

The figure that the volume of sales by 1.5% of retailers is 59% of the total is corroborated fairly closely by the results of the trial census of distribution made by the United States Bureau of the Census in 11 cities. This showed that 1.77% of retail establishments do 46.46% of the business. The difference may be due to the fact that the 11 places covered by the trial census were, with the exception of two communities, cities of over 100,000 population. The smaller cities and towns have more small retailers. This probably indicates that for the country as a whole a smaller proportion of establishments, such as is given in the table, does a larger proportion of the total business than in the 11 cities covered in the trial census.

The close corroboration furnished by these two sets of figures indicates that the method here devised for measuring the volume of business by means of financial strength yields results with a satisfactory degree of reliability.

The facts as to the number of leading business concerns and the volume of business transacted by them are highly significant and worthy of careful consideration by business executives interested in the industrial and business market, or in specific sectors of this market.

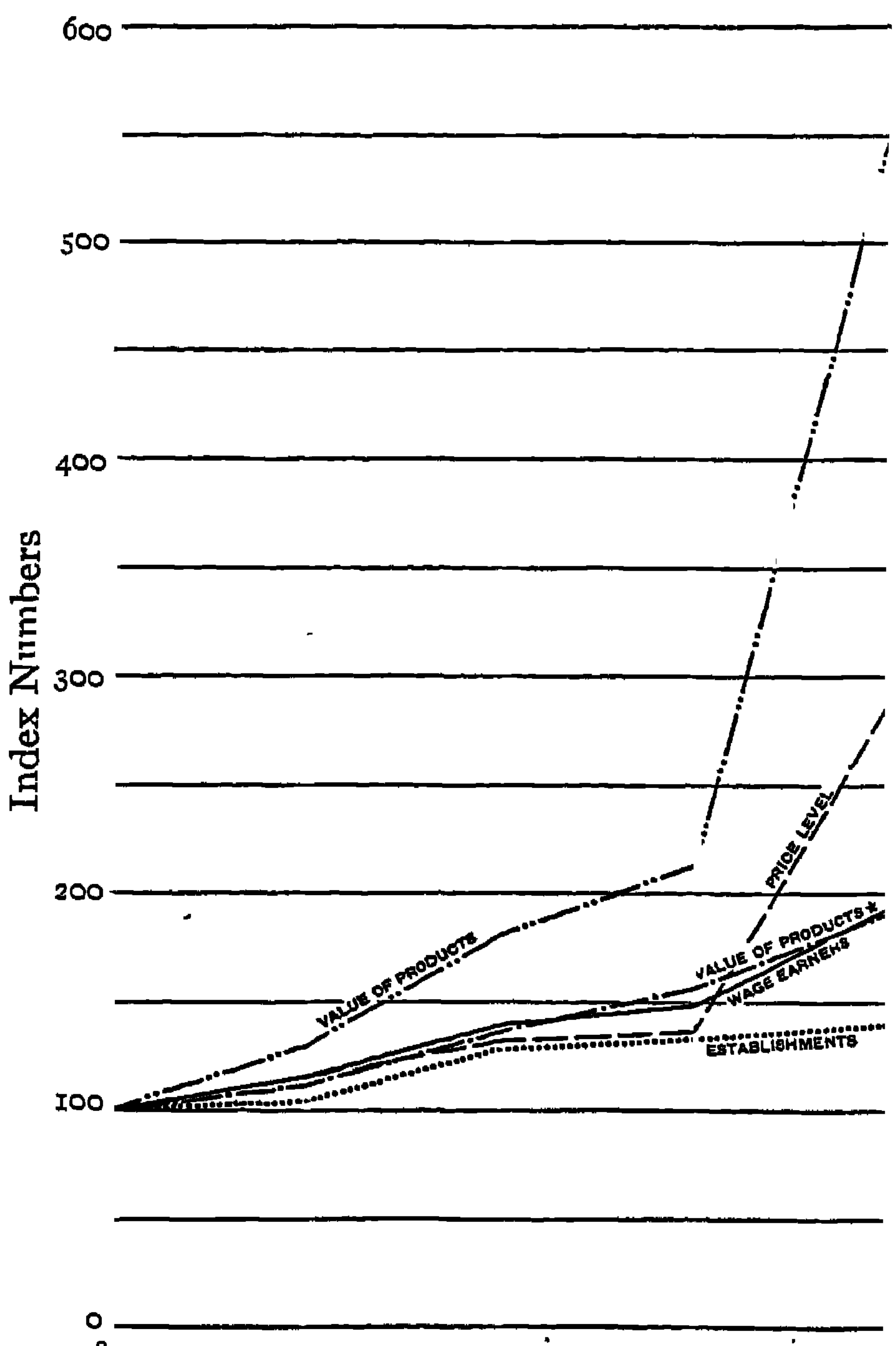
The facts are nothing short of startling, namely (1) that of 2,260,400 firms in the nation, only 3.8% (85,766) can, on the basis of pecuniary strength, be considered major enterprises; and (2) that these 3.8% of concerns do 86% of the volume of business.

B. CONCENTRATION IN MANUFACTURING[10]

Industry is organized in three distinct planes. (1) At the bottom, and fundamental to the other two, are the industrial establishments, the units of economic enterprise. (2) The second plane of industrial

[10] Adapted from Willard L. Thorp, *The Integration of Industrial Operation, Census Monograph*, III (1924), pp. 36–74.

organization includes the operating combinations—groups of establishments which are operated from some one central office—and, finally, (3) at the top, are found those less tangible alliances, the holding company, the financial combination, the trade association, and similar types of economic organization.



NUMBER OF ESTABLISHMENTS, WAGE-EARNERS, AND VALUE OF PRODUCTS: 1899–1919

* Value of products represents production expressed in dollars adjusted on 1914 basis.

I. *The size of single establishments.*—It is important to have clearly in mind the exact nature of the unit of economic enterprise employed by the Census Bureau. This unit is known as the industrial establishment. In general the qualification test of an establishment is that it must keep a single set of books of account and must not extend geographically outside a single locality.

The first fifteen years of the century indicate no very definite trend toward larger establishments, if measured in terms of wage earners. The greatest development came during the war period, when the average number of employees per establishment increased from 25.5 to 31.4.

The wide variation between different industry groups in terms of the average number of wage earners per establishment is worthy of note. These wide differences are demonstrated in the tables on pages 864 and 865.

That there is, in general, some trend toward larger establishments must be expected, for new industries are growing rapidly which require large establishments for profitable operation, such as automobile,

rubber-tire, beet-sugar, and electrical-apparatus enterprises. Since these and other similar industries are expanding at a much more rapid rate than the older industries they naturally tend to raise the general average for industry as a whole; but the census data certainly can not be used to support the hypothesis that the tendency for industrial establishments since 1900 has been, in general, to increase in size. The rapid concentration, so evident in the nineteenth century, is by no means so marked in the twentieth. Certain industries apparently do follow this tendency, and certain other industries follow directly the opposite tendency.

SIZE OF ESTABLISHMENTS MEASURED IN TERMS OF WAGE EARNERS AND VALUE OF PRODUCTS: 1899 TO 1919

Census Year	Factories, Excluding Hand and Neighborhood Industries			
	Number of Manufacturing Establishments	Average Number of Wage Earners per Establishment	Number Based on Average per Establishment in 1899	Value of Products per Establishment on 1914 Basis
1899	207,514	22.7	100.0	$ 74,282
1904	216,180	25.3	111.5	79,573
1909	268,491	24.6	108.4	79,374
1914	275,791	25.5	112.3	87,916
1919	290,105	31.4	138.3	101,489

In order to make the discussion of large-scale production more definite, the 16 industries in which the largest proportion of establishments employ over 250 wage earners, and the 16 industries in which the largest proportion of establishments produce over $1,000,000 value of products, were determined. The results are given in the table on page 864. As can be seen, 13 industries are common to both lists. These 13 industries, therefore, represent the most extreme cases of large-scale production, measured both by wage earners and by value of products.

Leading in both lists is sugar refining. The nature of the sugar-refining process is such as to make production on a small scale well-nigh impossible. The machinery is very complex, and quantity production is essential. The enormous capital investment required to prepare a refinery for activity has been concentrated, therefore, in a small number of very large establishments.

The industry ranking second is the rubber boot and shoe industry, with which may be discussed the rubber belting and hose industry. In these fields there are three fundamental reasons for large-scale operations: First, the fact that the control of these industries is centered in the hands of a small number of individuals; second, the technical requirements of the industrial processes, and third, the use of raw materials which must be imported from South America or the East Indies. Since the most economical method is to acquire this material in bulk, the rubber industries require a large outlay of capital. This same situation is a factor of importance in the sugar-refining industry in those cases in which unrefined sugar is imported from the West Indies.

LEADING INDUSTRIES IN LARGE-SCALE PRODUCTION: 1919

Industry	Manufacturing Establishments						
	Total Number	Employing Over 250 Wage Earners (Average Number)			Value of Products Over $1,000,000		
		Number	Per Cent of Total	Rank	Number	Per Cent of Total	Rank
Sugar, refining	20	19	95.0	1	20	100.0	1
Boots and shoes, rubber	25	22	88.0	2	21	84.0	5
Shipbuilding, steel	162	101	62.3	3	100	61.7	13
Watches	18	11	61.1	4	6	33.3	......
Iron and steel, steel works and rolling mills	500	305	61.0	5	330	66.0	10
Locomotives	17	10	58.8	6	11	64.7	11
Cars, electric-railroad	7	4	57.1	7	4	57.1	14
Smelting and refining, copper	34	19	55.9	8	30	88.2	2
Belting and hose, rubber	15	9	60.0	9	11	73.3	7
Ordnance and accessories	26	12	46.2	10	14	53.8	15
Cars, steam-railroad	99	44	44.4	11	53	53 5	16
Smelting and refining, lead	25	12	48.0	12	22	88.0	3
Smelting and refining, zinc	39	17	43.6	13	29	74.4	6
Wire	66	28	42.4	14	33	50.0	.....
Pencils, lead	12	5	41.7	15	5	41.7	......
Iron and steel, blast furnaces	195	51	26.2	16	130	66.7	9
Oilcloth and linoleum	32	8	25.0	......	20	62.5	12
Sugar, beet	85	9	10.6	......	58	68.2	8
Oil, linseed	26	1	3.8	......	22	84.6	4

The remaining 10 industries in which concentration is outstanding are all metal or metal-products industries. The three smelting and refining industries—copper, lead, and zinc—appear, and also steel works and rolling mills and blast furnaces. Five industries making complex metal products complete the list—steel ship-building, locomotive, steam-railroad cars, electric cars, and ordnance. In these industries the scale must be large because the unit manufactured is large. Locomotives can not be made by one man turning out a small value-product each year. It is perhaps because of this situation that

DISTRIBUTION OF ESTABLISHMENTS BY NUMBER OF WAGE EARNERS IN SIX INDUSTRIES EMPLOYING OVER 300,000 WAGE EARNERS: 1919

Industry	Number of Establishments	Wage Earners (Average Number)	Establishments Employing								
			No Wage Earners	1 to 5 Wage Earners	6 to 20 Wage Earners	21 to 50 Wage Earners	51 to 100 Wage Earners	101 to 250 Wage Earners	251 to 500 Wage Earners	501 to 1,000 Wage Earners	Over 1,000 Wage Earners
Cars and general shop construction and repairs by steam-railroad companies	1,744	484,437	......	125	206	253	255	397	238	164	106
Cotton goods	1,288	430,966	2	26	81	118	183	417	218	152	91
Foundry and machine-shop products	10,934	482,767	757	3,814	2,784	1,636	868	703	228	107	37
Iron and steel, steel works and rolling mills	500	375,088	......	5	13	32	48	97	103	102	100
Lumber and timber products	26,119	480,945	843	16,640	5,333	1,547	662	698	296	85	15
Shipbuilding, steel	162	344,014	1	6	12	11	17	14	17	10	74

the tendency toward large-scale production is apt to be exaggerated. To a large extent, the development has arisen from new industries which require large-scale methods in their operation rather than from the expansion of production in the older and more established industries.

Having noted certain industries in which large-scale production prevails, it is of importance to determine how extensive such large-scale activity is among manufacturing enterprises in other fields. The extreme differences among industries are at once evident. In the table above are given, for 1919, the distributions of establishments according to number of wage earners for the six industries which employed more than 300,000 workers each. In the lumber and timber

products and the foundry and machine-shop products industries most of the establishments are small, although in the one case it is due to the scattered location of raw materials and in the other to the nature of its market. Cotton goods and steam-railroad cars and repairs show their greatest concentration in establishments employing 101 to 250 wage earners; and the remaining two industries—steel works and rolling mills and steel shipbuilding—show their concentrations in even larger establishments. There could be no clearer indication of the fact that industry at the present time is operating on all scales of production.

An examination of separate industries brings to light the fact that not only are certain industries tending toward large-scale production, but certain other industries are tending toward production on a small scale. There are 17 industries which, during the period 1914 to 1919, increased in total number of establishments and decreased in total number of wage earners. In four more industries the number of establishments remained unchanged but the number of wage earners decreased. Furthermore, there are many industries in which the number of establishments increased more rapidly than the number of wage earners, thus lowering the average number of wage earners per establishment in 1919 as compared with 1914. The 21 industries in which an increase or no change in number of establishments took place concurrently with a decrease in number of wage earners are:

Artificial flowers
Belting, leather
Canning and preserving, oysters
Clothing, women's
Copper, tin, and sheet-iron work
Corsets
Cotton lace
Fireworks
Gold and silver, leaf and foil
Grindstones
Lard, not made in meat-packing establishments
Matches
Mirrors, framed and unframed
Nets and seines
Paving materials
Rules, ivory and wood
Shirts
Smelting and refining, lead
Statuary and art goods
Wall paper, not made in paper mills
Windmills

The tendency toward small-scale production is most evident in the women's clothing industry. The number of establishments in each

size group up to 50 wage earners increased and the number in each size group above 100 wage earners decreased during each five-year period, and the intermediate group increased during the first five years and decreased during the second. A more or less different tendency appears in men's clothing, where there appears to have been a noticeable development of medium-sized shops during the later five-year period, but the average size of establishments was somewhat smaller in 1919 than in 1909. The fact that the trend in the direction of manufacturing on a smaller scale appears also in industries such as hats and knit goods, in which the number of wage earners is increasing (the list above includes only industries in which the number of wage earners is decreasing), emphasizes a development hitherto little recognized—the tendency toward small-scale production.

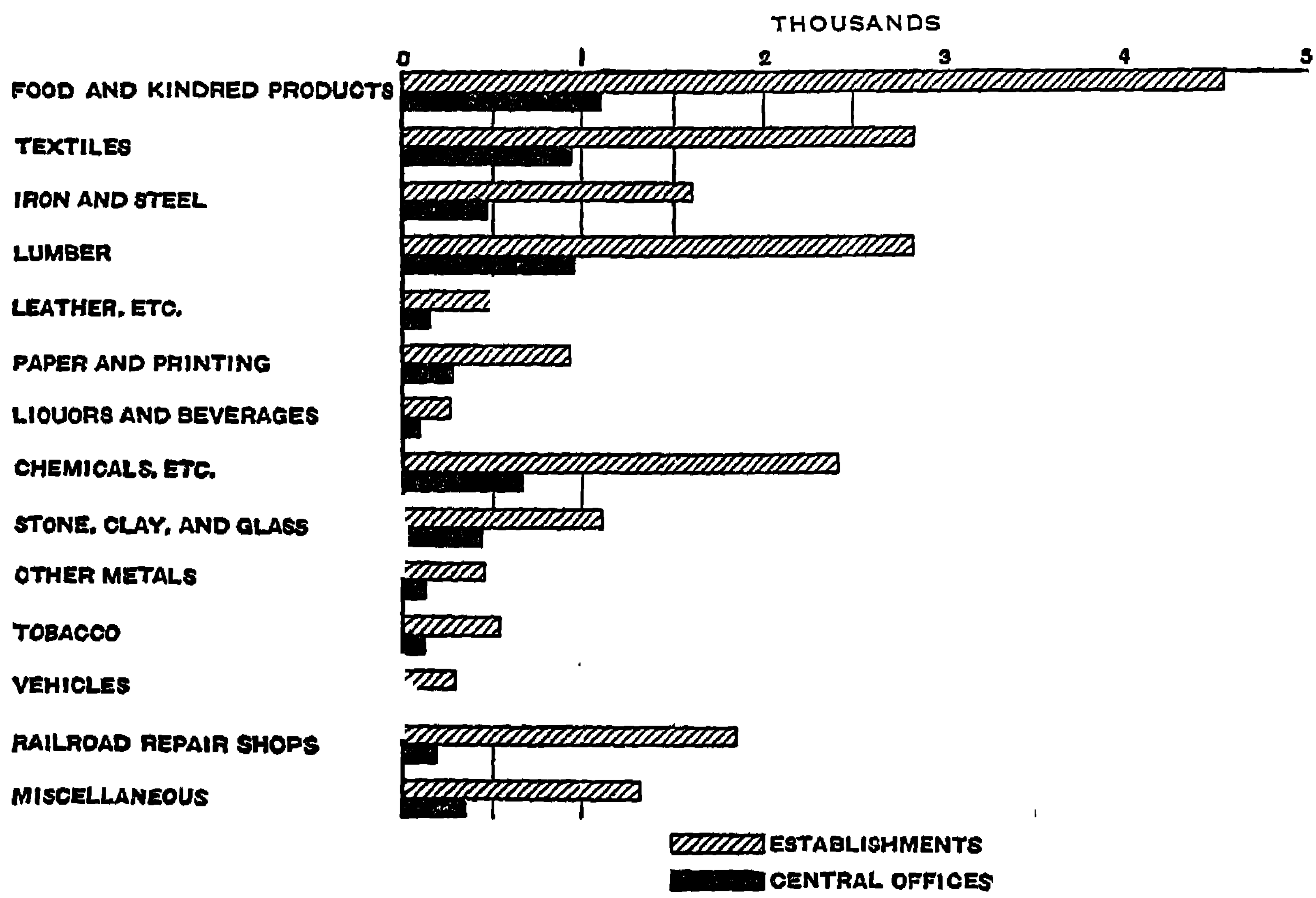
II. *Central office groups.*—A central office group exists when two or more industrial establishments are operated from a single central office.

The term "establishment" was defined as an enterprise within an industry and within a locality, and may consist of more than one plant, only providing a common set of books is kept. Consequently, a central-office group exists when a single central office operates enterprises in more than one locality or in more than one industry, or more than one plant within a locality and industry, providing those plants are sufficiently separate entities to keep separate books of account.

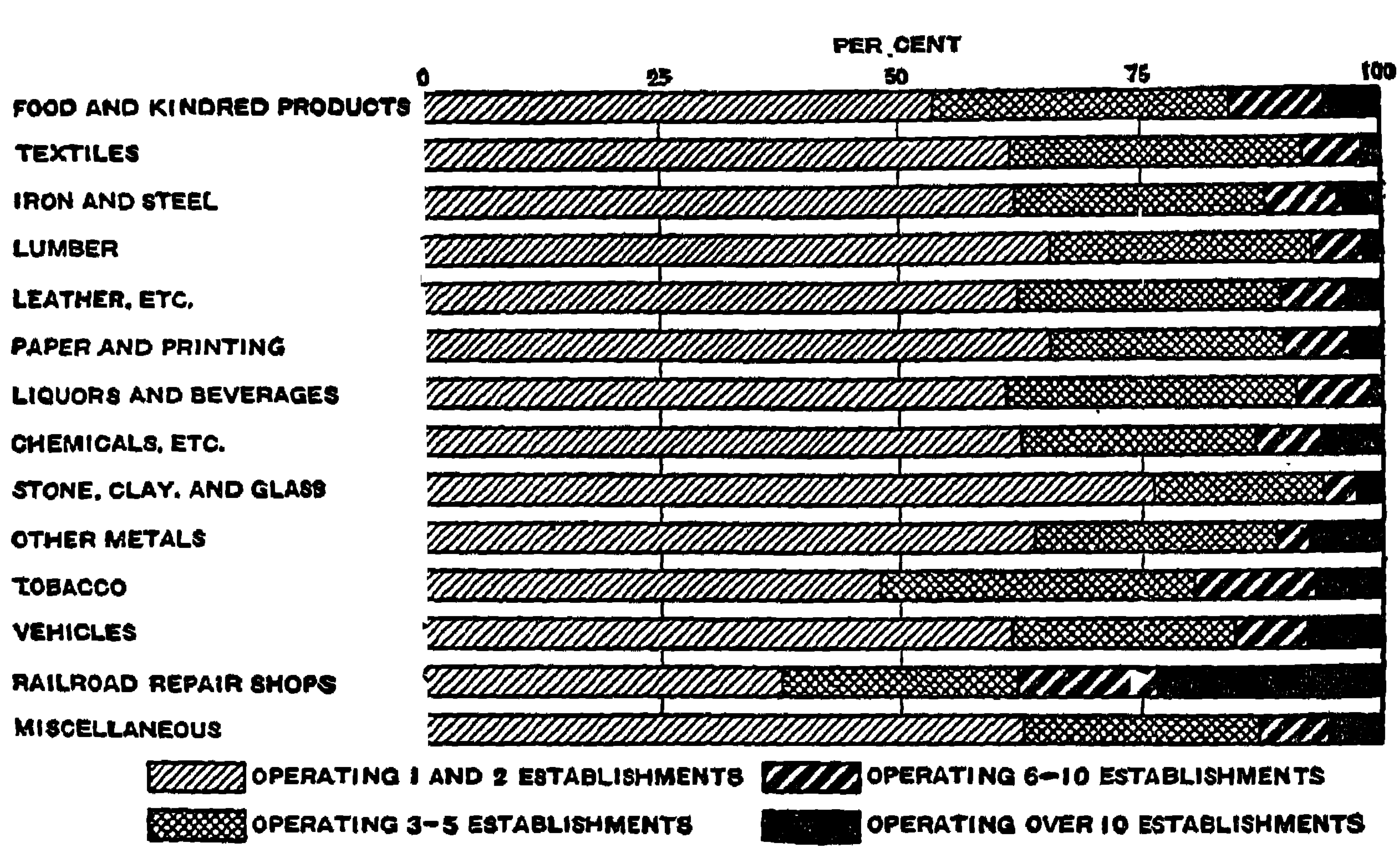
The central-office group is a type of industrial combination; but industrial combinations may be combinations of factories, or corporate entities, etc., and they may be bound together by interlocking directorates, financial organization, or other methods. The central-office group is perhaps the simplest and most elementary form of combination—industrial establishments which are, by definition, units of operation bound together by a definite, tangible bond, a common central office.

The records of the Census Bureau indicate that there are in the United States at least 5,838 such industrial combinations or, as they will be hereafter called, central-office groups. A few typical problems are as follows: To what extent does this form of industrial combina-

tion appear in industry? Does it extend beyond the manufacturing field? In which manufacturing industries is it most extensive? How large are these central-office groups? Does the size vary from industry



Central Offices and the Establishments Which They Operate, by General Groups of Industries



Central-Office Groups according to Number of Establishments Operated, by General Groups of Industries

to industry? Where are central offices located? Where are establishments located with reference to their central office? Do these organizations extend into other countries? What are the advantages of centralized operation? Another group of questions has perhaps even more significance: What different types of establishments appear in single central-office groups? What functional relationship exists between the various units in the combinations? To what extent do the relationships represent "vertical" and "horizontal" combinations, organized integration, fabrication, by-product manufacture, etc? In what industries do the different types of functional relationship appear?

As might be expected, the smaller central-office groups predominate. Over three-fifths of the cases included are those in which but one or two establishments are operated by the central office. At the other extreme in size are two central offices each of which operates more than 100 establishments—one in the food-products group and the other operating railway repair shops—and 10 central offices operating more than 60 establishments each. There is apparently no definite break in the distribution which might indicate a point above which central-office operation is not feasible. The distribution follows quite clearly a regular curve.

See also:

"The Changing Form of the Business Unit in Manufacture," page 471.

"Most Workers Are in Large Establishments," page 590.

C. CONCENTRATION IN THE ELECTRIC POWER INDUSTRY[20]

There is an electric power monopoly.

Moreover, there is an electric power monopoly organized and financed, not for fair and efficient public service, but for ruthless exploitation, uninterrupted and unrestrained by anything approaching effective Government intervention or control.

[20] Adapted from Gifford Pinchot, *The Power Monopoly. Its Make-up and Its Menace*, pp. 1–7. (Privately printed, 1928.)

We need not be surprised that State and Federal authorities have stood in awe before this gigantic Nation-wide power monopoly, because beside it, as its creator, financial supporter, and master, stands the concentrated money power of the United States, which today is the dominating money power of the world.

This dominating money power has seized upon the electric power resources of our country with a full realization of the fact that before very many years it will be not "the hand that rocks the cradle," but the hand that turns the electric switch that will rule the land.

The power monopoly study submitted herewith covers 4,362 corporations. This list of power corporations may or may not be entirely complete. But it has attained so near to absolute completeness that it is without doubt the most complete list ever compiled or published. It includes the big holding companies, the smaller holding companies, companies owned or controlled by the holding companies, and what few independent companies remain.

Some minor companies of recent origin, and some companies so long ago absorbed or dissolved that no current records are available, may be missing from this list, but that the list is practically complete, and does give a full view and a true view of the electric power industry is proved by the fact that one division of the corporations here listed —that of the 41 big holding companies—alone accounts for 82 percent of the electric energy produced in the United States.

In order to make the list as complete as possible, the listed companies also include those subsidiary organizations of power companies which are not engaged in the electrical power business, but through which electric holding companies control coal, coke, gas, water, street railways, bus lines, bridges, lumber, real estate, amusement parks, and other interests contributing to their monopoly.

The records of corporations in this report are given as nearly as possible as of June 30, 1927, with the nearest applicable and available financial and statistical figures—for the most part as of December 31, 1926.

The most striking fact uncovered by this study of 4,362 corporations in the power industry is the thoroughness with which concentration has been achieved. Under this concentration the power corporations fall into four general groups:

Operating Companies	
3,108	controlled by 41 big holding companies
877	" " 125 smaller holding companies
126	" " 31 investment companies allied with the power interests
85	entirely independent companies
4,196	operating companies
166	holding companies
4,362	corporations owned or controlled by the electrical power industry, not including the 31 investment companies mentioned above

The records show that the 41 big holding companies control a little more than 82 percent of all the electric power generated in the United States. The records further show that almost 83 percent of the country's population depends upon the 41 power giants for the electric energy they need.

But the high degree of concentration and monopoly included within the 41 is not made clear until they are grouped under the dominating financial interests on their boards of directors. Thus identified by their financial directors, 23 of the 41 big power corporations group themselves as follows:

UNDER GENERAL ELECTRIC COMPANY CONTROL

American Gas & Electric Co.
American Power & Light Co.
Detroit Edison Co.
Edison Electric Illuminating Company of Boston
Electric Power & Light Corp.
Lehigh Power Securities Corp.
Nat'l Power & Light Co.
Southeastern Pwr. & Lt. Co.

(Note: The Electric Bond and Share Securities Corporation, which in 1925 took over the Electric Bond and Share Company as holding company for the General Electric Company, appears from the records mainly as a financial and supervisory management company and is, therefore, listed in this report among the 31 investment companies allied with the power corporations.)

UNDER SAMUEL INSULL CONTROL

Commonwealth Edison Co.
Commonwealth Lt. & Pwr. Co.
Middle West Utilities Co.
Midland Utilities Co.
Nat'l Electric Power Co.
North American Lt. & Pwr. Co.
Public Service Company of Northern Illinois

UNDER J. P. MORGAN & CO. CONTROL

Nat'l Public Service Corp.	Public Service Corp. of N. J.
Philadelphia Electric Co.	United Gas Improvement Co.

UNDER A. W. MELLON CONTROL

American Water Works and Elec. Co., Inc.	Columbia Gas & Electric Corp.

UNDER H. M. BYLLESBY & CO. CONTROL

Pacific Gas & Elec. Co.

UNDER HENRY L. DOHERTY & CO. CONTROL

Cities Service Co.

These six major financial interests which exert control over 23 of the 41 big power corporations as listed above, also exercise a joint control over 12 more of the great electric corporations as follows:

American Light & Traction Co.	Mellon-Doherty.
American Public Utilities Co.	Morgan-Insull.
Brooklyn Edison Co.	Morgan-Ryan-Brady.
Commonwealth Power Corp	General Electric-Morgan-Byllesby-Doherty.
Consolidated Gas Co. of New York	Morgan-Ryan-Brady-Rockefeller.
Consolidated Gas, Elec. Lt. & Pwr. Co. of Baltimore	Morgan-Mellon-Aldred.
Mohawk Hudson Power Corp.	General Electric-Morgan-Brady.
Montana Power Co.	General Electric-Morgan-Ryan-Brady.
Northeastern Power Corp.	General Electric-Morgan-Harriman.
Standard Gas & Elec. Co.	Mellon-Byllesby.
United Light & Power Co.	Mellon-Doherty.
Western United Corp.	Morgan-Insull.

Twenty-three plus 12 is 35, which leaves six of the 41 big power corporations whose centralized control is not yet identified by the financial interests on their boards of directors.

These are:

Associated Gas & Electric Co.	Southern California Edison Co.
Buffalo, Niagara & East. Pwr. Co.	General Gas & Electric Corp.
North American Co.	Utilities Power & Light Corp.

The relative importance of the financial groups which exercise control over 35 of the 41 big power corporations is shown by the following table of production, population served, and total assets of each group:

Companies	Control	K.W.H. Sold	Population Served	Total Assets
8	General Electric . .	13,474,105,496	19,125,000	$1,725,122,021
7	Insull	7,733,854,205	11,226,395	910,607,822
4	Morgan	4,131,426,095	14,197,364	1,107,468,721
2	Mellon	2,409,225,214	2,790,000	815,930,227
1	Byllesby	2,157,886,980	2,472,000	329,365,258
1	Doherty	1,307,477,634	3,000,000	663,128,487
12	Joint Control . . .	12,406,968,650	21,561,488	2,607,840,578
6	Unidentified . . .	12,753,249,612	16,620,000	1,859,355,508
41	Totals	56,374,193,886	90,992,247	$10,018,818,622

Since the six major financial interests dominate both the 23 corporations listed under their names and also the 12 corporations under joint control, we have only to subtract the figures for the six unidentified corporations in order to get a fairly accurate measure of the six-sided power monopoly held by the General Electric-Insull, Morgan-Mellon, Byllesby-Doherty community of interest.

If we subtract the figures for the six still unidentified power corporations, we find that the six-sided master of the 35 big power corporations holds an amazing supremacy and domination:

	K.W.H.	Population
Total 1926 figures for the United States . . .	68,732,000,000	110,000,000
Under control of six major power interests . .	43,620,944,274	74,372,247
Percentage controlled by six major power interests	63.46%	67.61%

In other words, the General Electric-Insull-Morgan-Mellon-Byllesby-Doherty six-sided power monopoly controls but little less than two-thirds of the entire country's electrical power, and has a little more than two-thirds of the country's population at its mercy for its electric energy and service.

D. CONCENTRATION IN MARKETING[21]

The general opinion is that it is in commerce that the law of concentration is most felt. This, however, is simply because it is in commerce, in the form of large stores, that it is most obvious to the general public; it is here that the complaints of the small shopkeepers, crushed by the competition of these colossal enterprises, are loudest.

[21] Taken by permission from Charles Gide, *Political Economy*, pp. 167–68. (D. C. Heath & Co., 1913.)

The economic superiority of the large store is due to the following causes:

1. *Economy of labour.*—This first advantage consists mainly in the power which the large store has of pushing the division of labour to its highest point by creating as many departments as there are classes of goods. But it results also from the mere grouping together of employees. In the small shop, the greater part of the time is wasted. There are often hours during which each seller is unemployed. Take, for example, a hundred firms, each employing ten workers. Combine these into one business; obviously, to turn over the same amount as did the hundred houses separately, it will not be necessary to keep the thousand employees. There will be no need of a hundred cashiers or a hundred bookkeepers. Each worker, moreover, being now able to work without stopping, will be able to do two or three times as much as before, and will thus, in himself, take the place of two or three workers.

2. *Economy of space.*—In order to have a hundred times more room in a shop or factory it is not necessary to occupy a space a hundred times larger, nor to use a hundred times more material in the building of the premises. For, if the volumes of two cubes are to one another as 1 to 1,000, their surfaces are as 1 to 100. Now it is the surface only that costs. Besides, apart from mathematics, experience has shown that neither the cost of construction nor the amount of rent increases in direct proportion to the space occupied. The smallest shop in Paris, with a turnover of 500 francs a day, will pay 6,000 to 8,000 francs rent. But the Bon Marché, which turns over on an average more than 500,000 francs a day, thus doing a thousand times more business, does not by any means pay a thousand times more rent. Its rent is calculated at one million francs at most, or not more than the equivalent of two days' sale.

3. *Economy of capital.*—The circulating or working capital of a large shop may be much less than that of a small one, in proportion to the amount of business done, and this for two reasons:

a) Because, by buying them in large quantities or by manufacturing them directly, the large shop does not need to spend so much in obtaining its goods.

b) Because its money returns to it more rapidly, as its goods lie only a few days or weeks on the shelves, instead of months or years. It is clear that a capital of a hundred is equivalent to a capital of a thousand, if it can be renewed ten times as quickly. Moreover, the fact that the goods will be fresher and more up to date, owing to this quick renewal, is an additional attraction to the consumer.

c) Lastly, the large undertaking has, as a rule, better credit than the small, and obtains its necessary capital at a lower rate.

E. CONCENTRATION IN MONEY AND CREDIT—AN ACCUSATION[22]

If by a "money trust" is meant—

> an established and well-defined identity and community of interest between a few leaders of finance which has been created and is held together through stockholdings, interlocking directorates, and other forms of domination over banks, trust companies, railroads, public-service and industrial corporations, and which has resulted in a vast and growing concentration of control of money and credit in the hands of a comparatively few men—

your committee has no hesitation in asserting as the result of its investigation up to this time that the condition thus described exists in this country today.

This increased concentration of control of money and credit has been effected principally as follows:

First, through consolidations of competitive or potentially competitive banks and trust companies, which consolidations have in turn been brought under sympathetic management.

Second, through the same powerful interests becoming large stockholders in potentially competitive banks and trust companies. This is the simplest way of acquiring control, but since it requires the largest investment of capital, it is the least used, although the recent investments in that direction for that apparent purpose amount to tens of millions of dollars in present market value.

Third, through the confederation of potentially competitive banks and trust companies by means of the system of interlocking directorates.

Fourth, through the influence which the more powerful banking houses, banks, and trust companies have secured in the management

[22] Adapted from the *Report of the Committee to Investigate the Concentration of Control of Money and Credit*, February 28, 1913, pp. 55–56, 130–33.

of insurance companies, railroads, producing and trading corporations, and public utility corporations, by means of stockholdings, voting trusts, fiscal agency contracts, or representation upon their boards of directors, or through supplying the money requirements of railway, industrial, and public utilities corporations and thereby being enabled to participate in the determination of their financial and business policies.

Fifth, through partnership or joint-account arrangements between a few of the leading banking houses, banks, and trust companies in the purchase of security issues of the great interstate corporations, accompanied by understandings of recent growth—sometimes called "banking ethics"—which have had the effect of effectually destroying competition between such banking houses, banks, and trust companies in the struggle for business or in the purchase and sale of large issues of securities.

As regards the parties to this combination or understanding or community of interest, by whatever name it may be called, beyond the inner groups and subgroups are banks and bankers throughout the country who co-operate with them in underwriting or guaranteeing the sale of securities offered to the public and who also act as distributors of such securities.

The patronage thus proceeding from the inner group and its subgroups is of great value to these banks and bankers, who are thus tied by self-interest to the great issuing houses and may be regarded as a part of this vast financial organization. Such patronage yields no inconsiderable part of the income of these banks and bankers and without much risk on account of the facilities of the principal groups for placing issues of securities through their domination of great banks and trust companies and their other domestic affiliations and their foreign connections.

Through their power and domination over so many of the largest financial institutions, which, as buyers, underwriters, distributors, or investors, constitute the principal first outlets for security issues, the inner group and its allies have drawn to themselves the bulk of the business of marketing the issues of the greater railroad, producing and trading, and public-utility corporations, which, in consequence, have no open market to which to appeal; and from this position of vantage,

fortified by the control exerted by them through voting trusts, representation in directorates, stockholdings, fiscal agencies, and other relations, they have been able in turn to direct the deposits and other patronage of such corporations to these same financial institutions, thereby strengthening the instruments through which they work.

F. CONCENTRATION IN THE INTERNATIONAL FIELD[23]

Since 1914, two sharply divergent trends have developed in international business. First of these is a new emphasis on foreign trade and a tendency to stress the economic unity of the world. The war brought home to the minds of men the economic interdependence of nations. On the other hand, the war disorganized and in some cases entirely blocked up old lines of traffic and left in its wake a spirit of passionate nationalism which is being interpreted in large measure in economic terms.

Economic nationalism.—The doctrine of national self-sufficiency is playing an important part in the exploitation of new lands for foodstuffs and raw materials, and even though there are justifiable grounds for questioning the wisdom of pushing the theory to its ultimate conclusion, events are forcing its acceptance in practice. Thus it would have been well, no doubt, had American tire and automobile manufacturers begun years ago the development on a fairly large scale of rubber plantations under their own control, for they now find themselves at the mercy of a British combination under governmental auspices. The struggle for oil is perhaps the most spectacular endeavor to gain control of the sources of supply.

Diffusion of industry.—A parallel trend is that toward the diffusion of the manufacturing industries. The rise of Germany as a contender for the international market for many classes of manufactures and the industrial development of the United States have been the outstanding economic events of the last fifty years. Changes only less important are taking place elsewhere. Many of us have seen the rise of Japan as a manufacturing nation and we are now witnessing the gradual industrialization of such countries as Brazil and South Africa, Australia and India.

[23] Adapted from J. Howard Ardrey, "Cross Currents in International Business," *Commerce Monthly,* Vol. VII, No. 6 (October, 1925), 3–4, 8–13. (The National Bank of Commerce.)

Slowly but surely the cotton textile industry is being established in every country and the wool manufacture is also becoming world-wide. Perhaps in no line has so notable a diffusion of a manufacturing industry taken place with such profound effects on international trade as that which has occurred in the case of boots and shoes. Development of the major industries has been accompanied everywhere by steady progress of the minor industries such as preparation and preserving of food products, the making of clothing and haberdashery and miscellaneous products for household and personal use. Establishment of branch plants for the assembling or manufacture of machinery and automobiles is a phase of great importance in connection with the spread of manufactures into countries heretofore comparatively little industrialized.

Meantime quick and comparatively cheap circulation of news by telegraph, cable and radio, freer travel, and a tendency toward a common culture are making the world a market unit. Efficient and rapid transportation over great distances is resulting in faster turnover with consequent narrowing of the margin of profit necessary for international trading.

The new complexity.—The effects of all these changes on methods of doing business are certain to be profound and the probabilities seem to be in the direction of growing complexity and further development of great international organizations equipped to buy and sell in every market and if need be to produce their goods in any country. This is not a new phase. At the beginning of the seventeenth century great trade organizations were in existence, typical of them being the English and Dutch East India Companies. As early as the first quarter of the sixteenth century, the Fuggers of South Germany were doing an international banking and trading business. Their operations extended from Hungary and Poland to Spain and from Naples to Antwerp.

The development of international firms in that earlier time occurred, however, as a result of conditions almost exactly the reverse of those which prevail today. Business was then in the hands of large organizations because imperfect communication and the difficulties and hazards of transportation made it impossible for the small trader successfully to carry on a foreign business. There being no means of

quick communication, merchants were obliged to carry on their foreign trading operations in person or by a trusted personal representative. Specialized products of high unit values constituted a large part of this earlier commerce.

Now, however, a new complexity is developing. Summarizing the world situation in a single phrase, goods of most classes originate in many countries and are exported in every direction. It might have been hoped that the breadth of the market, the wide dissemination of information, the promptness and efficiency of transportation, and the perfection of the methods of financing international transactions would have brought about a further simplification of foreign trade; but this apparently is not the case. The first requisite of successful foreign trade today is the ability to secure prompt information from the remotest sources, for although news from a distance may be more or less fragmentary, it travels swiftly. The struggle for export markets is so keen that the man in New York who makes an error of judgment because of lack of knowledge of the character of the Indian monsoon or the outlook for the Australian raisin crop will be caught marketwise, for he may rest assured that some competitor will have the facts of the situation.

The hazard now is the hazard of much knowledge rather than lack of knowledge and, in consequence, international commerce is tending more and more to fall into the hands of great international firms whose operations are world wide.

The need for wide-reaching organizations for foreign trade in manufactured goods has always been apparent. It grows greater rather than less as competition becomes sharper both within the countries which manufacture for export and between the producers of competing nations. The Germans early recognized this need by the establishment with governmental approval and support of kartels, an important function of which is combination for export. While prewar development in this direction was more noteworthy in Germany than elsewhere, the comparative freedom to form combinations in most European countries was favorable to large-scale export business wherever conditions warranted it. Centralized buying had also made a good deal of progress in Europe prior to 1914.

In order to put the business of the United States on a more even

footing the Webb-Pomerene Act permitting combination for export trade was passed in 1918. While the act has not proved the panacea it was expected to be, it has created a situation wherein American business can follow the lines of development clearly indicated for foreign commerce. United States firms cannot legally combine for importation, but the fact that American consumers now find themselves at the mercy of foreign monopolies of rubber, coffee, potash, nitrates and some other commodities has prompted a suggestion from Mr. Hoover that the Webb-Pomerene Act be so amended as to permit combinations for import trade.

See also:
"International Relationships in Manufacture," page 280.
"The Cable and International Trade," page 530.

2. ADVANTAGES CLAIMED FOR LARGE SCALE OPERATIONS

A. THE CASE FOR INTEGRATION OF INDUSTRY[24]

One classification commonly used in discussing industrial groups is that of horizontal and vertical combinations. A horizontal combination is generally defined as a consolidation or expansion of economic activity at some one stage in the industrial process so that several plants which do the same kind of work are operated as parts of a single enterprise. It is a combination of establishments on the same level of industry, which would otherwise be competitors. A vertical combination, on the other hand, is one which contains within the group, establishments which operate in different stages in the process necessary to prepare the final product for market. The development of this type of industrial organization is often termed "the integration of industry."

Vertical combinations are entered into for various reasons but they resolve themselves chiefly to but two, either as a more or less fortuitous way of investing surplus capital, or as a means of increasing the competitive strength of the operator. An increase in competitive strength is inclusive of the more notorious motive, to make more prof-

[24] Adapted from W. L. Thorp, *The Integration of Industrial Operation, Census Monograph,* III (1924), pp. 253-59.

its. There are six elements in this increase in competitive strength, each of which deserves separate comment.

A. Economies in production.—In addition to the various economies which are generally considered as the result of increasing the scale of any industrial operation, there are certain economies which quite definitely belong to the vertical combination. It is probable that in particular instances many different variations might be found, but in general, there are four.

1. Elimination of the middleman and marketing costs. In certain industries, the activities of middlemen are so extensive as to add a considerable increment to the necessary costs of uncombined establishments.

2. A better adapted product. The combination avowedly changes its emphasis from an attempt to make the highest profit in each concern into an attempt to make the highest profit from the sum total of concerns. The assurance of a market having certain definite requirements makes it possible to organize the earlier stages of the activity in a more specialized way than would be possible if there were always the possibility of having to shift manufacture to meet the specifications of another customer.

3. A better coordinated process. An illustration is the continual difficulty of nonrailroad-owned coal mines to procure necessary cars, when railroad-owned mines appear to have a surplus.

4. An assured supply. There can be little doubt but that a single operator can organize his enterprises so that the constituent parts will dovetail in a much more harmonious fashion than is done by the traditional forces of supply and demand. He is able to plan further ahead because of his wider range of activity. He is undisturbed by market fluctuations which would otherwise have affected his supply of raw materials.

B. Independence of operation.—The tendency for integration is generally backward. The manufacturer usually does not add a factory which will utilize the products of his original enterprise, but rather enters into the industry from which he buys his material. If the market for his original product be good, he does not need to extend to processes beyond that field but would naturally attempt to increase the amount of his product for that market; if it be bad, he does

not care to enter that field. If he expands forward, his original enterprise will guarantee him materials; if he expands backward, it can guarantee him a market. Of the two, the market is the more difficult to obtain. Finally, the fact that any disturbance of the source of his supply of materials upsets the operation of his plant far more than a disturbance of the market results in making integration more prevalent toward raw materials. It is definitely to the advantage of the operator to be independent, to rely on the activities of as few other operators as possible. The combination which is self-contained is in a much better competitive position because of its independence and freedom from various otherwise disturbing factors.

C. Distribution of risk.—The vertical combination is, in a sense, an illustration of the old adage, "Don't carry all your eggs in one basket." In such a combination there is a pooling of profit and loss. This has a decided advantage in several ways. It reduces to some extent the speculative element in industry. It likewise prevents the necessity for shutting down factories for short periods, which would in many cases involve a cost greater than the loss from running them for the intermediate period. If, for example, a combination only mined coal, a sudden drop in the market might necessitate the closing of its mines, which is a very expensive operation. If, however, it also operated a number of coke plants, it is quite conceivable that the coal mines would be operated, even though coal might be purchased more cheaply on the market.

D. Greater resources.—This element must be particularly mentioned, although it is usually an element of advantage to any combination. In a vertical combination, however, the fact that these resources of the company are not centered about a single industrial process, but are distributed throughout several different industrial activities, lends additional value. This is of great advantage, particularly for purposes of borrowing money in times of depression.

E. Wide range of products and processes.—The distribution of the activities of a combination through several different levels of industry gives it a number of possible outlets for its products. It opens up more opportunities, and, in general, makes it more difficult to upset the concern through competition in any particular market.

F. Increased profit per unit of product.—The last element enter-

ing into the increase in competitive strength which arises from vertical combination is the *increased profit per unit of product.* In such a combination, the final product as put on the market has a much lower minimum cost than if produced by a series of independent operators. The profits which ordinarily appear in each market along the way are summed up in the final market, and the operator has a much greater possible reduction in price before he must go out of business than his less integrated competitors.

There are three additional conditions which may explain why vertical combinations are sometimes developed rather than horizontal combinations. The first is purely a psychological truth—that it is much easier to bring together men who have been bargaining together and reaching compromises, than men who have been bitter competitors. The second is the fact that manufacturers of successive products must have monetary dealings with each other. Consequently, there is a possible development of debts such as to make the taking over of such a firm by another a necessary way of obtaining payment for credit advanced. The third deals with the problem of the law. At present, a horizontal combination is much more apt to run into legal difficulties than a vertical one, since its operations are concentrated in a single market, while the vertical combination is active in many different lines.

See also "Social Significance of the Integration of Industry," page 890.

B. THE CASE FOR LARGE-SCALE SINGLE ESTABLISHMENTS[25]

There are certain advantages which should logically develop from large-scale production. The following outline is, in general, a presentation of the various possible economies of producing on a large scale. They represent potentialities and are conditioned by both the type of industry and the nature of management.

[25] Adapted from Willard L. Thorp, *The Integration of Industrial Operation, Census Monograph,* III (1924), pp. 86–90.

A. ECONOMIES IN PRODUCTION

1. The materials required, as well as fuel or electric power, can usually be obtained more cheaply if purchased in large quantities. In addition large purchasers secure more ready attention and more careful consideration from the sellers.

2. The labor force may be more advantageously utilized, since the processes can be divided, resulting in saving due to division and specialization of labor.

3. The plant and equipment may be more advantageously utilized. The demand for products will be more exactly forecast and therefore there need not result slack and rush periods of work. According to figures collected by the National Bureau of Economic Research, however, the large enterprises showed greatest variation in activity from 1919 to 1922.

4. The materials may be more effectively utilized either by by-product manufacture or by disposing of waste in bulk.

5. Standardization can be more easily applied resulting in better coordination within the process.

6. Research and development through investigative agencies may be carried on at less cost per unit of output and may result in a saving in the technical processes of the industry.

B. ECONOMIES IN MARKETING

1. Transporation may be done in greater bulk resulting in a saving per unit transported.

2. Advertising costs will represent a smaller burden on each unit of output although the amount of advertising may actually be increased.

3. The selling force required will not increase in the ratio in which the sales increase, therefore resulting in less cost per unit of product.

4. Distributing and selling agencies may be maintained.

5. The value of good will and of trade-marks and designs will increase with the volume of business.

C. ECONOMIES IN MANAGEMENT

1. The overhead cost per unit of product, particularly the fixed charges, will not increase proportionately to the production.

2. Better management can be afforded, with skilled heads for the different departments and branches. This factor is somewhat offset by the greater impersonality of large concerns.

3. Cost accounting, production standards, etc., may be introduced at less cost per unit of product.

D. ECONOMIES IN FINANCIAL ADMINISTRATION

1. Borrowings can be made at cheaper rates as a result both of larger issues of bonds and of better security.

2. The amount of risk taken will be less because of the pooling of profits and losses, the greater ability to study outside market conditions, and the more able administration.

3. Greater financial resources will be available in case of depression or business strain.

These various potential advantages of large-scale production must be taken into account in explaining the situation in certain industries. Although the manufacturer in all probability expands his business because of pure acquisitiveness, personal pride, or the necessity of investing a surplus, it is nevertheless true that the factors in the above outline are those which, by entering into such a reorganization, insure its life.

The advantages of large-scale production give but one view of the situation. There are certain industries which are more eligible for large enterprises than others. In general, the following types of industry appear to have developed production on a large scale to the greatest degree:

1. Industries which require a large capital investment, particularly in plant and equipment: Sugar refining, copper smelting, steel mills.

2. Industries which are monopolies, and which have a sufficiently large market to make operation on a large scale feasible. This includes artificial monopolies, such as those based on patent rights, as well as the monopolies by nature: Public utilities, manufactured ice.

3. Industries in which a natural resource is required and in which that natural resource is limited in amount and localized in geographical distribution: The manufacture of lead and zinc products.

4. Industries in which the product is capable of standardization and particularly in which a test for quality is required: Sugar, salt, meat packing, etc.

5. Industries in which the product is highly complex and can be constructed, therefore, only by an intricate fabricating system or a large and diversified organization: Typewriters, adding machines, textile machinery, and automobiles.

6. Industries in which the product is large in size, requiring complex equipment for construction and large capital investments: Shipbuilding, locomotives, ordnance.

Although the enumeration of the many advantages of large-scale production presents a very strong argument for such a form of economic organization from the social viewpoint, there are nevertheless, various elements which interfere with such a complete organization of economic enterprise. Certain enterprises do not lend themselves to large-scale operation. Some of the general types of industry in which small-scale production is necessary are:

1. Industries whose product can not be standardized and establishments which attempt to make products to suit the differing tastes of consumers. Such industries produce "tailored" suits, high-grade furniture, art goods, finely bound books, etc.

2. Industries producing for a small market, such as those manufacturing artists' materials, nets and seines, models and patterns.

3. Industries in which the local market is small and whose product has a high transportation cost. In the manufacture of artificial-stone products, or bricks in many localities, the activity could never be conducted on a large scale because of the limitation of the market for its product and the expense of transportation.

4. Industries in which the material used is widely scattered and can not be concentrated because of high transportation cost or rapid deterioration. Cheese factories and cider mills may be included in this class.

5. Industries in which skilled labor is the chief element, such as

engraving, job printing, etc., whose products are really services rather than commodities.

The problem of the scale of production can be significantly analyzed only by recognizing the many factors which enter into each particular situation. No general theory can be of any great value. In addition to the factors already mentioned, there are numerous others, such as the amount of labor warfare in the industry, which often favors smaller shops; the managerial capacity of the enterpriser; the general trend of the industry as a whole, since it is much easier to develop large-scale production in an industry which is expanding rapidly than in one which is steadily losing ground; the traditional nature of the enterprise, etc.

Throughout industry as a whole, no general tendencies of growth can be found. Although the number of large-scale establishments is rapidly increasing, the size of establishments at any given moment varies to a marked degree from industry to industry. The tendency to increase or decrease in size varies both from industry to industry and from period to period. The problem of the scale of production, therefore, is one of particular industries and even of particular periods, the factors entering into each situation being often very different and always very numerous.

C. THE CASE FOR INDUSTRIAL COMBINATIONS[26]

First, then, the *driving forces.* Becoming clearly apparent about 1890, there was a marked decrease in the opportunity for speculative gains along the old lines. Formerly there had been a wide, uncertain field of natural resources to be exploited, and great prizes were drawn from physical environment. Now this field has been narrowed down and become pretty definitely known. The tillable public lands are gone; the gold, coal, iron, and copper mines are exploited, and so with the forests; the railway map requires little revision. Consequently the old opportunities for great gains through exploiting such fields have rapidly diminished. This fact, when coupled with the desire for gain through the employment of a greatly increased fund of

[26] Adapted by permission from L. H. Haney, *Business Organization and Combination,* pp. 134–38. (The Macmillan Co., 1914.)

capital and a multiplied labor force, impelled industrial leaders to seek new fields, such as existed in control of manufacturing industry through combination.

At the same time, a development in the character of markets and business risks which had long been unfolding came to a head. As markets became more truly continent-wide, or world-wide, that part of production which consists in moving goods from place to place and holding them from time to time became more important, and the conditions of exchange seemed to dominate the technical conditions of manufacture. *Business* risks arising from changes in expenses and prices came to bulk larger in comparison with *technical* problems. Now the way to control the business situation, and reduce the risks of exchanges which involve widely separated places and time, is to combine the direction and management of the various producers.

But doubtless the most active impelling force was the increasing severity of competition. In the days before the Civil War, business was on a relatively small scale. There was generally a [illegible] personal relation between producer and consumer, and less specialization existed. Capital, too, was relatively less important; and this was notably true of fixed and specialized capital, so that the danger of great loss was less. As a result of such conditions, competition was less intense. But with modern large-scale capitalistic production, competition often becomes cut-throat and intensely wasteful.

So much for the more important driving or impelling forces. On the other hand, certain conditions invited combination, the *beckoning conditions*. Thus, in the potential gains to be secured by regulating prices and trade conditions, the obverse of the driving force of intense competition was to be seen. Even at low prices, if economies could be effected, there was still an opportunity for gain. More particularly characteristic of the time, however, was an almost conscious realization of the possibilities of profits on a large-scale production of the common necessities of life—coal, ice, lumber, nails, meat, salt, tobacco, sugar, etc. Captains of industry arose who saw, first, that great profits might be made by selling large quantities of such products even at a small gain per unit; and second, that in selling such things monopoly would have great power because the demand for them does not fall off rapidly when prices are raised or kept up. Both

of these visions were based on the width of the market or the inelastic character of the demand for such necessaries.

A distinct feature of this phase of the matter was formed by the tariff protection afforded to these industries. Though excepting his own industry, Mr. Havemeyer, of sugar-trust fame, testified before the Industrial Commission that the tariff had been the occasion for the formation of most of the large combinations prior to 1900. It is too obvious to need discussion that whenever a tariff wall is built the control of prices is made easier and combination is invited.

Another condition which invited the combination movement was the possibility of gain by overcapitalization. By watering stock and making two shares grow where one grew before, it was possible to reap large speculative profits, and such profits were reaped from bountiful crops. There is no doubt that several large combinations have been promoted chiefly because the promoters believed that they could sell an increased capitalization for more money than they had to pay for the properties combined.

But had these driving and beckoning conditions not operated in conjunction with certain *facilitating conditions*, the combination movement would not have come just when it did nor in just the same way. The tariff, for example, was such a condition. Under Republican administrations the principle of protection was more and more strongly applied, reaching a high point in the McKinley Tariff Act of 1890 and a climax in the Dingley Act of 1897. While it can hardly be maintained that tariffs *cause* trusts, they certainly facilitate their formation by raising a wall against foreign competition, and such cases as salt and sugar, rails and nails, paper and window glass, are evidence to the fact.

Last, but by no means least, the development of corporate organization was itself a factor in facilitating combination. Prior to 1850 the use of the corporation in business had not been great, and it was not until the seventies that the general corporation laws were much utilized. The result was that capital was limited in amount and combination difficult. Through the agency of joint-stock shares, control over a large number of business organizations may readily be concentrated in the hands of a few men. They have merely to purchase enough stock to control each corporation and vote that stock with a

united policy, and to make the purchase they need only form a new corporation whose shares may be exchanged for the controlling holdings. By proceeding in this way they do not have to gain the consent of the organizations which they desire to combine, nor do they increase their financial liability. Such a means of combination sharpened one of the most effective weapons of the trust builder—secret control of plants used locally to cut prices under those of particular competitors while keeping them up elsewhere. In so far as the corporate form could be used to minimize legal responsibility, it also facilitated combination.

3. SOCIAL SIGNIFICANCE OF THE INTEGRATION OF INDUSTRY[27]

When the industrial revolution brought the machine techniques, it supplanted the handicraft stage wherein a single craftsman, or small group thereof, carried on the production of the various articles under a single roof, so to speak. There was differentiation of crafts, to be sure, but each craft apparently comprehended the production of finished goods from the initial preparation of raw materials. While some materials were prepared by one group for use by another group of workers, the usual arrangement was that just indicated, and one entrepreneur directed or carried on the complete industrial process.

Now it happened that these inventions came initially at a time when there were no large accumulations of money capital for investment in the new machines. This lack of large accumulations of capital (and of means for accumulating it from a number of small holders) made it more or less necessary for the industrial entrepreneur to change his methods of operation. Under the handicraft scheme the single individual, or partnership, undertook the direction and management of the complete process of production from raw materials to finished goods. It now became necessary for each of them to confine his operations to the conduct of one or perhaps two steps in this total industrial process, because the small capital of each limited the number and variety of the new machines which he could purchase.

It was one thing, however, to seize upon the newly invented machines for the establishment of separately owned factories, each of which carried on one step in the sequence of technically allied and in-

[27] Adapted from L. K. Frank, "The Significance of Industrial Integration," *Journal of Political Economy*, XXXIII (1925), 179–92.

terdependent industrial processes; it was another thing to find means for overcoming the loss of unified direction of these separately controlled processes so that they could work together, for it is obvious that, with the multiplication of separate factory enterprises, each dependent upon the stage technically prior for obtaining its raw materials and upon the stage technically subsequent for disposing of its products, some sort of arrangements had to be elaborated for relating up these separately owned and controlled establishments. Hence began the development of the modern art of buying and selling, for carrying materials from the point of original production through the separately owned and controlled machines and on to the distributor to the final consumer or user.

At first this need was met by simple contract and sales, whereby the goods in the several stages of refinement or elaboration were transferred to the next subsequent stages for an agreed-upon price. But as the industrial equipment became more complex and more widely distributed among separate owners and geographical districts, there was a more or less concomitant development in the elaboration of pecuniary devices and operations and the organization of markets, as shown especially in loan credit, negotiable instruments and similar instrumentalities for facilitating buying and selling, speculating in commodities, and the like.

If, then, we look upon the movement toward vertical integration of industry as part of the process of social evolution, in which the older group practices and arrangements are giving place to a newer scheme of things, we will perhaps gain a better understanding of its significance and its operation. For undoubtedly vertical integration is an attempt to bring together under one management the separate stages of the industrial process which technically require unified direction and control. Since this technical requirement cannot effectively nor continuously be met through buying and selling of goods between separately owned stages, however ingeniously and elaborately those pecuniary operations be conducted, it has become both feasible and desirable to bring a number of consecutive stages of production under one managerial control.

To meet the needs of this task, there has developed during the past twenty-odd years an entirely new technique which is variously called cost accounting, administrative statistics, planning and control,

or industrial engineering. This new technique provides a method of managing one or more factories by a system of controlling, whereby the advantages (or many of them), which seemingly were obtainable only by the individual enterprise and initiative of a factory-owner, may be obtained fairly easily. For the method of planning and control is to plan in great detail what work is to be done and the machinery and personnel to carry out those plans, to delegate the authority to see that the plans are carried out, and then frequently and precisely to record and measure the results accomplished, the costs incurred, and the unfinished portions of the task. By such a technique it becomes possible to supervise one or a dozen organizations carrying on distinct operations at widely separated locations and to co-ordinate them into a single industrial process, so that materials flow from plant to plant, from stage to stage, as readily and as surely as they pass through a single machine or department.

Buying and selling at money prices, then, give place to planning and control in an integrated industry as a means of industrial co-ordination. Thus integration implies much more than the superficial facts of ownership and security control indicate; it is not merely a scheme of pecuniary relationships, but a movement of technical development, taking effect through credit machinery so far as institutional elements (property, income, etc.) are concerned, but primarily an industrial methodology. That is why it is so significant as contrasted with combinations (or so-called horizontal integration) where the relationships between the constituent plants and the objectives sought were principally pecuniary. It is probable that the period of combination has prepared the way for integration, since the very magnitude of the combinations has made integration forward and backward both possible and desirable.

Viewed with a little perspective, the movement toward integration is not so much a new departure as a return to the unified direction and control of production which obtained in the days preceding the coming of machine industry.

See also:
"The Place of Management Today," page 806.
"The Case for Integration of Industry," page 880.

4. FORMS OF COMBINATION AND AGREEMENT[28]

An outline classification of *combinations* would run somewhat as the following:

I. Simple Combinations:
 1. Association (direct combination of natural persons as in partnerships).

II. Compound Combinations:
 1. Association (the loosest agreements directly between individual members of different associations: trade "associations," some simple "agreements," etc.).
 2. Federation (combination of organizations which remain separate and retain considerable autonomy: most simple "agreements" and pools).
 3. Consolidation (combination of organizations in which, while members may remain nominally separate, direction of business is fused).
  a) Partial consolidation:
   (1) Securities holding (direction of business organizations consolidated through stock ownership, with separate existence formally maintained).
  b) Complete consolidation:
   (1) *Merger* (complete consolidation, members of one business organization absorbed by another).
   (2) *Amalgamation* (complete consolidation, members of two or more organizations coalesce to form a new organization).

To facilitate an understanding of *agreements* the following attempts at classification are presented:

A. *As to scope and membership:*
 I. LOCAL.
  1. Trade Conditions.
   a) *Sellers* (with or without sales agency).
    (1) Manufacturers, growers, etc.
    (2) Wholesalers or jobbers.
    (3) Retailers.
    (4) Wholesalers and retailers.
    (5) Manufacturers and jobbers.
    (6) Manufacturers, jobbers, and retailers.
   b) *Buyers* (as under *a*), but not so full).
  2. Prices.
   a) *Sellers* (as under I, *a*), "Factors' Agreements" included).
   b) *Buyers* (as under I, *b*)).
  3. Output, and Prices and Output.

[28] Adapted by permission from L. H. Haney, *Business Organization and Combination*, pp. 131–32, 148. (The Macmillan Co., 1914.)

II. STATE AND NATIONAL (as under I).

III. INTERNATIONAL (as under I, but perhaps not I, 1, *a*), (3), (4), (6)).

B. *As to methods:*

I. MONOPOLISTIC (generally secret).

1. Gentlemen's agreement (generally voluntary).
2. Contract agreement.
   a) *Voluntary* (with or without a sales association).
      (1) Without forfeit.
      (2) With forfeit.
         (*a*) Refusing to sell to or buy from violators.
         (*b*) Boycotting.
         (*c*) Pledge deposit.
         (*d*) Fines.
         (*e*) Use of patents.
   b) *Involuntary or compelled* (with or without sales association, as under *a*)).

II. OPEN.

1. Gentlemen's agreement (generally secret and voluntary).
2. Contract agreement (as under I, 2).
   a) *Secret.*
   b) *Public.*

5. THE CORPORATION AS AN INSTRUMENT OF CONCENTRATION

A. MINORITY CONTROL[29]

Where the property is not held under a voting trust and where the stock has its voting rights, a small fraction is able to control a corporation if the holdings are widely scattered, and this is due mainly to the supineness and absence of initiative of stockholders in protecting their interests.

In this connection the officers of great life insurance companies were called [before the committee] and extracts from the minutes of their meetings of policyholders were produced, with the following results:

NEW YORK LIFE INSURANCE CO.

Year	Number of Policyholders	Number of Votes Cast by Policyholders
1908	About 900,000	62
1909	Between 900,000 and 1,000,000	32
1911	About the same	41

[29] Adapted from the *Report of the Committee to Investigate the Concentration of Control of Money and Credit,* February 28, 1913, pp. 145–47.

MUTUAL LIFE INSURANCE CO.

Year	Number of Policyholders	Number of Votes Cast by Policyholders	Remarks
1908	About 600,000	93	
1909	About 600,000	130	
1911	Between 600,000 and 700,000	13,527	Contested election

The Equitable Life Assurance Society has about 500,000 policyholders; approximately 25 to 50 vote at annual elections; the agency force is about 5,000. As the result of extraordinary efforts to get out a vote, they sent out 500,000 requests for votes, with stamped envelopes for reply, and in response received 22,000 votes.

The situation that exists with respect to the control of the so-called mutual companies is in a modified way illustrative of all great corporations with numerous and widely scattered stockholders. The management is virtually self-perpetuating and is able, through the power of patronage, the indifference of stockholders, and other influences, to control a majority of the stock.

B. CONTROL BY A DOMINATING SPIRIT[30]

In other cases a single enterpriser dominates the corporation and wields full authority. The stockholders elect his candidate to office, the directors defer to his judgment, the officials act as his agents. His position may be firmly entrenched by outright ownership of a majority of the voting shares, or it may rest upon personal influence over the owners of voting shares sufficient to carry elections. In these "one-man" corporations the theoretical division of authority and function becomes a legal fiction. Practically, the dominating head of affairs, who may not be an officer or even a director, corresponds to the old capitalist-employer, except for the fact that he furnishes a far smaller proportion of the capital, carries a far smaller proportion of the pecuniary risk, and performs a far smaller proportion of the detailed labor of superintendence. These limitations do not restrict, but on the contrary enhance, his power, because they mean that the individual who "owns the control," or dominates those who own it, can deter-

[30] Taken by permission from W. C. Mitchell, *Business Cycles*, pp. 33–34. (University of California Press, 1913. Author's copyright.)

mine the use of a mass of property and labor vastly greater than his own means would permit.

C. VOTING TRUSTS[31]

A method of protecting the interests of minority stockholders and of the creditors of a corporation is the formation of a voting trust. This is an agreement under which a majority of the voting stock of a corporation is placed in the hands of trustees who are authorized to vote it under whatever limitations may be prescribed. The trustees usually issue in return for the stock so deposited "voting trust certificates," which certify that the stock is held in trust by the trustees and which may be sold and transferred in the same manner as certificates of stock. As the trustees are usually men of high standing who are under instructions to vote the stock for certain officials or in behalf of certain measures, the minority stockholders may safely feel that so long as the agreement exists no radical change in the policy of the corporation can take place, and the rights of all stockholders alike will be respected.

D. THE HOLDING COMPANY[32]

By holding company is meant a corporation which exists merely for the purpose of holding and dealing in the securities of other corporations.

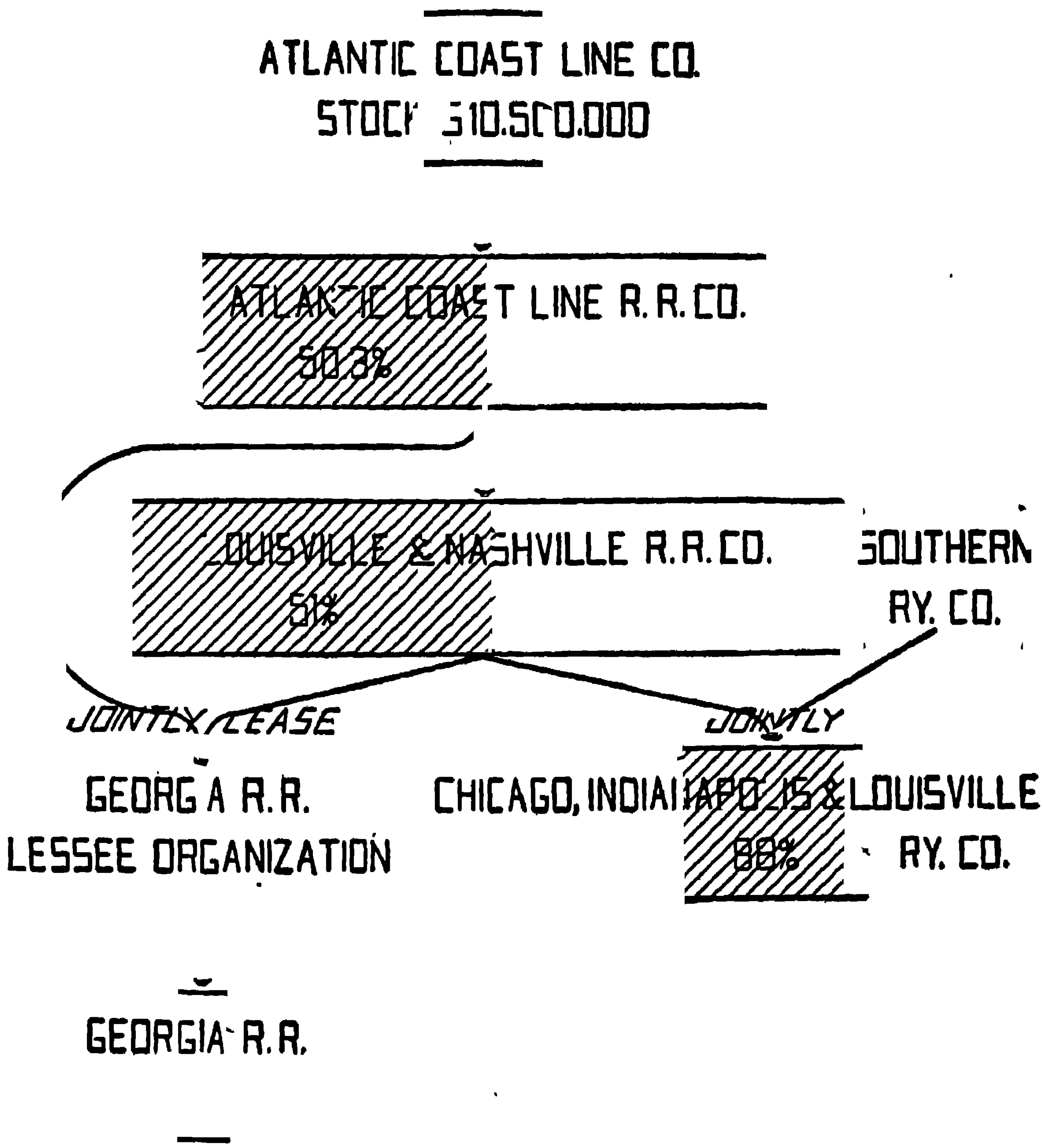
The accompanying diagram will make clear the more important intercorporate relationships of the Atlantic Coast Line System.

The Atlantic Coast Line Company was chartered in Connecticut in 1889 for the purpose of consolidating under one ownership the network of southern railways along the Atlantic coast, these railways being amalgamated in 1900 into the Atlantic Coast Line Railroad Company. The Atlantic Coast Line Company, the holding company, on June 30, 1906, owned (including capital stock subscribed for but not fully paid) $25,266,300 out of $50,134,200 of the stock of the Atlantic Coast Line Railroad Company, or a little over 50 per cent. It also owned $11,500,000 of the bonds of the same company. This stock ownership carried with it equities of very great value. This be-

[31] Taken by permission from W. H. Lough, *Corporation Finance*, pp. 77–78. (De Bower-Elliott Co., 1909. Author's copyright, 1917.)

[32] Adapted from *Interstate Commerce Commission, Special Report No. 1*, "Intercorporate Relationships of Railways in the United States, as of June 30, 1906," pp. 21–24.

comes clear when we observe that the Atlantic Coast Line Railroad Company owned on the same date $30,600,000 out of $60,000,000, or 51 per cent of the stock of the Louisville & Nashville Railroad Company. This latter corporation and its controlling railway, the Atlantic



An Example of Intercorporate Relationships

Coast Line Railroad Company, were the lessees of the railway properties of the Georgia Railroad and Banking Company; and the Louisville & Nashville Railroad Company, jointly with the Southern Railway Company, owned 88 per cent of the stock of the Chicago, Indianapolis & Louisville Railway Company. The capital stock of the Atlantic Coast Line Company was reduced in May, 1897, from $10,000,000 to $5,000,000 by the issue of certificates of indebtedness in

lieu of the shares retired. In 1898 the stock was again restored to the original amount of $10,000,000 by a stock dividend of 100 per cent, representing the accumulated profits. The company had outstanding on June 30, 1906, $10,500,000 of stock (excluding $2,100,000 of stock subscribed for but not fully paid) and $13,000,000 of certificates of indebtedness. It therefore appears that an ownership of slightly over $5,000,000 of capital stock in this holding company controlled solely and jointly through ownership and lease a railway system of over 11,000 miles in extent, with a capitalization of over $725,000,000.

E. PREFERRED STOCK AND CONCENTRATION OF CONTROL[33]

In most corporations all the stock is of one class and each share has an equal right to its proportion of the assets and earnings. Such stock is called "common" because no share has any privileges which do not attach to all the other shares. In general, common stock may be defined as stock which does not possess any special or peculiar rights.

Other corporations, however, set aside certain amounts of stock in a separate class and grant to this class specific privileges. Such stock is called preferred.

It may be a convenient means of separating a company's stock into different voting classes. Sometimes the preferred stock has no vote at all; sometimes it elects a limited number of stockholders. In either case the owner of the majority of the common stock may elect a majority of the board of directors. Therefore, a much smaller interest will control the business than would be necessary if all the stock issued voted alike.

An illustration.[34]—The New England Investment and Security Co. controlled the following properties:

The Worcester Railways and Investment Co., which controlled:

The Worcester Consolidated Street Railway Co., which leased:

[33] Taken by permission from G. J. Shoholm, *The Boston Social Survey*, p. 10. (Author's copyright, 1916.)

[34] Adapted by permission from W. H. Lough, *Corporation Finance*, pp. 71–73. (De Bower-Elliott Co., 1909. Author's copyright, 1917.)

The Worcester & Webster Street Railway.
The Webster & Dudley Street Railway.
The Springfield Street Railway, a consolidation of:
The Western Massachusetts Street Railway.
The Springfield & Western Street Railway.
The Milford, Attleboro & Woonsocket Street Railway.
The Interstate Consolidated Street Railway.
The Attleboro Branch Railroad.

The whole outstanding common stock represented a par value of \$100,000. The preferred stock, largely held by investors in Springfield, Worcester, and Boston—"the public"—and of a par value of \$4,000,000, was legally in the position of the minority.

The owners of the 1,000 common shares selected four of the seven trustees, and the owners of the 40,000 preferred shares selected but three.

It was possible thus for the owners of a majority of the \$100,000 common stock to dictate the policies of this group of railways that comprised a capital of over \$4,000,000.

F. INTERLOCKING DIRECTORATES[35]

We shall not reach the heart of the problem if we confine our attention to service as directors by the same individuals on boards of associated corporations. We should be regarding the mere form of things and overlooking the substance. What concerns us is the interlocking of interests in such manner as to effect a substantial influence upon the policy of both corporations. To be sure this may be most directly accomplished by the election of the same individual to both boards; but it may also be attained in some indirect manner, as by a substantial stock ownership resulting in a request for representation on the directorate. Such representative may be a person of capacity and initiative or a mere dummy, but the desired interlocking is effective in either case. It therefore seems proper to widen our definition so as to bring under our consideration not only the individuals with large interests in associated corporations but their representatives as well. Finally, for any adequate treatment of the question it is neces-

[35] Taken by permission from F. H. Dixon, "Interlocking Directorates in Railway Finance," *Journal of Political Economy*, XXII (1914), 937–38.

sary to include not only directors of corporations but also officers, for many of the problems of interlocking now occupying attention arise out of situations with which directors of a corporation as such have had little to do.

Confining our attention to the problem of interlocking as it concerns the railways, our discussion falls naturally into four divisions, according to the purpose in mind in the creation of the interlocking relationship: (1) interlocking for financial or credit purposes; (2) interlocking for industrial and commercial purposes, of which the principal one is the purchase of supplies; (3) interlocking for the purpose of railway construction and operation; (4) interlocking to restrain competition.

An example of interlocking directorates.[36]—An inquiry published in 1913, indicated that the firm members or directors of Morgan and Company, the First National Bank of New York, and the National City Bank of New York together held:

One hundred and eighteen directorships in 4 banks and 3 trust companies having total resources of $2,679,000,000 and total deposits of $1,983,000,000.

Thirty directorships in 10 insurance companies having total assets of $2,293,000,000.

One hundred and five directorships in 32 transportation systems having a total capitalization of $11,784,000,000 and a total mileage (excluding express companies and steamship lines) of 150,200.

Sixty-three directorships in 24 producing and trading corporations having a total capitalization of $3,339,000,000.

Twenty-five directorships in 12 public utility corporations having a total capitalization of $2,150,000,000.

In all, 341 directorships in 112 corporations having aggregate resources or capitalization of $22,245,000,000.

G. MANIPULATION THROUGH BROKERS[37]

The stocks of the so-called "public" corporations—the stocks that are listed and actively dealt in on the Stock Exchange—are usu-

[36] Adapted from the *Report of the Committee to Investigate the Concentration of Control of Money and Credit*, February 28, 1913, pp. 86–89.

[37] Taken by permission from an address by Samuel Untermyer, delivered at the meeting of the Commercial Law League, July 27, 1916, pp. 26–27.

ally to a considerable extent in the hands of brokers who have bought them for customers on margin and hold them as security for the payment of the balances owing them on the purchase. These stocks are the pawns in the gambling game that constitutes the great bulk of the dealings on the Exchange. They are usually carried on the books of the corporation in the brokers' names, although the stock certificates are constantly passing from hand to hand among the brokers without apparent change of ownership on the stock books of the company.

In the very rare instances in which disgusted stockholders outside the Wall Street circle, driven to desperation by mismanagement or worse by their trustees, are so reckless or foolish as to imagine that they can change the control under existing law, the "insiders" gather in the proxies from the brokers in whose names these pawns are registered and in which the brokers have no interest except as pledgees. The speculating owner who owes his broker money on the stock, for which, by the way, the broker sees to it that he is and remains amply secured, has no voice in the matter. The broker should not be permitted to vote this stock without the written consent of the owner, and the Stock Exchange, instead of encouraging him to do so, should not permit it. The law should require every person to accompany his vote with an oath that he is the beneficial owner.

H. FORMS OF CONTROL OVER A CORPORATION[38]

Control of or over a corporation means "ability to determine the action" of that corporation. Control has been classified under eight different headings:

a) Right to possess all the property of the corporation except its instrumentalities of organization.

b) Right to possess all the property of the corporation except its instrumentalities of organization, its money, and its choses in action other than corporate securities.

c) Right to possess such portion of the tangible property of the corporation as is capable of being employed in discharging its specific duties. The principal form of control contemplated under this class, as well as under class (*b*), is the control effected through lease, class

[38] Adapted from *Interstate Commerce Commission, Special Report No. 1*, "Intercorporate Relationships of Railways in the United States, as of June 30, 1906," pp. 15–16.

(*b*) differing from class (*c*) only in the extent of the property and interests covered by the contract.

d) Right to exercise the major part of the voting power attached to the shares of stock and other securities of the corporation.

e) Right to name the major part of the board of directors of the corporation, whether by virtue of voting trust agreement or by virtue of title to securities or otherwise.

f) Right to foreclose a first lien upon all property of the corporation.

g) Right to foreclose a first lien upon a major part of the property of the corporation.

h) Right to determine the action of the corporation in a specific respect or respects.

This last class is intended to cover any peculiar forms of control not included in the other classes. Under this class would fall control through advances for construction purposes.

It will be observed that the various forms of control here defined may be classified roughly into ownership and lease.

6. OTHER INSTRUMENTS OF CONCENTRATION

A. THE ORIGINAL TRUST[39]

The form of organization that has given them their name "trusts" was the one started by the Standard Oil Trust in 1882, afterward followed by the Whisky Combination—the Distillers and Cattle Feeders' Trust—and by the Sugar Trust—the American Sugar Refineries Company. The plan of that organization was as follows: The stockholders of the different corporations entering the combination assigned their stock in trust to a board of trustees without the power of revocation. That board of trustees then held the voting power of the stocks of the different companies, and was thus enabled, through the election of directors, to control them absolutely. In place of the stock thus received the trustees issued trust certificates upon which the former holders of the stock drew their dividends, these being paid upon the certificates regardless of what disposition was made of the plants of the different corporations. Owing largely to hostile legislation and to the bitter feeling against the trusts above named, these trusts, after

[39] From the *Report of the Industrial Commission,* 1900, I, 10.

some adverse decisions of the courts, went out of existence, reorganizing as single corporations in most cases, and none at the present time remain.

B. POOLS[40]

American experience shows that pools and associations fall into one of two broad general classes, i.e., *simple* pools or *mixed* pools. For example, each of several manufacturers agrees to sell only a certain percentage of all the goods sold by the group, or a group of manufacturers agree among themselves that they will sell their goods only at certain prices. In either case the pool is *simple* or *simplex* according to the classification the writer has developed.

Suppose, however, that the group of manufacturers instead of doing only one of these two things had agreed to do both. In that case the pool or association would no longer be a *simple* but a *mixed* pool. And, as it contemplates two things, i.e., dividing output and fixing prices, it may be termed a *duplex* pool. Add a third object and the pool, still of course a *mixed* pool, becomes *triplex*, and so on. All these mixed forms, *duplex*, *triplex*, and *quadruplex* pools, are merely varied combinations of the simple or *simplex* pool which has seven distinct type forms as follows:

I. Output or traffic division.
II. Output curtailment.
III. Territorial division.
IV. Joint sales.
V. Price.
VI. Clearing house.
VII. Legitimate trader.

I. *Output or traffic division.*—The earliest pools in the United States, of which there is any definite record, were those formed in the cordage industry. So far as the evidence shows, they were *simplex* pools for the purpose of dividing the output. The first of them was organized about 1860 and they continued a more or less intermittent existence until the formation of the National Cordage Company many years later. The manufacturers met together and divided the business of the country according to certain percentages. Each manufacturer

[40] Adapted by permission from W. S. Stevens, "A Classification of Pools and Associations Based on American Experience," *American Economic Review*, III (1913), 545–56.

was required to make his returns monthly to a supervisor. If he had exceeded his percentage he was required to pay to the supervisor a certain amount per pound to balance the excess. Those, on the other hand, who fell below their percentage allotments drew upon the supervisor to make up the deficiency.

II. *Output curtailment.*—The pool curtailing output, either in simple or the mixed form, does not seem to have been common. Its simple form is shown in the Kentucky Distillers' Agreement of 1887. This combination had its origin in the depressed condition of the trade which had been practically continuous since a period of great overproduction in the earlier eighties. Although expressly stating the right of every signatory to make as much whiskey as he chose, this document provided that it was "for the pecuniary advantage of each" to make only the amount set opposite his name, and further imposed a penalty of twenty cents per proof gallon upon all whiskey made by any signatory in excess of the stipulated amount. Such money was then to be distributed among those confining themselves to the production allotted to them. On its face, the agreement thus appears to be for division of output, but such was not in reality the case. The significance of the agreement can be appreciated only when it is known that the amount set opposite the names of the various signatories (which does not appear in the text of the original agreement) was 100 gallons each, an amount so small that no distillery could afford to begin operations. It is thus seen that in reality the pool was purely for curtailing output, and did not in any sense contemplate a division of output.

III. *Territorial division.*—The United Refining Company, organized in the late eighties, dealt in an article which is the product of coal tar, a residuum of the gas works, and which is produced whether there is any demand for it or not. When a large surplus above demand occurred in any one section of the country the whole tendency was to "dump" that surplus upon a market in another section where there was only a moderate amount available. This tended to distribute among all the manufacturers the loss occurring through surplusage, instead of throwing it upon the party in whose territory it took place. Such a state of affairs led to a territorial agreement. Each party to the compact bound itself to confine its trade and sales to a

definite territory and not to send the surplus above such trade and sales elsewhere unless it were required. In event of a large surplusage and no other concern requiring the product, the manufacturer was to destroy it by changing it into pitch, which was accomplished through distillation. The pitch was used as fuel and was also shipped abroad. The manufacturer retained for himself the oils thus secured.

IV. *Joint sales.*—Historically the joint-sales pool is nearly as old as the output-division pool. In the former type of organization the various manufacturers agree to employ a common sales agent through which agent the products of the combination are marketed. The first organization of this type was formed in the sixties in the salt industry.

V. *Price.*—The price pool scarcely calls for definition since the majority of people are more familiar with this manifestation of combination than with any other. It is simply an organization for the purpose of fixing and controlling prices.

VI. *Clearing house.*—The significant feature of the joint-sales pool is the employment of a sales agent to market the product. In the case of the clearing-house pool, on the contrary, each party to the combination retains control of the marketing of its own product, while the central organization is used simply as a clearing house for the division of the profits realized. The clearing house may be an incorporated company or a purely voluntary association.

VII. *Legitimate trader.*—For several years past there has been noticeable an increasing tendency toward the elimination of the middleman in American business life. More and more, people are endeavoring to supply their wants directly. As this tendency develops, the retailer first finds his means of livelihood menaced and the jobber and wholesaler are also able to read the handwriting on the wall. It is out of this situation that what I term the "legitimate-trader" association has developed. This type of organization is of interest largely because of the striking contrast between its aims and methods of operation and those of the ordinary manufacturers' pool. The legitimate-trader association has in view one object—the confining of the trade to its (in their view) legitimate channel. But this will be found to resolve itself into three separate parts: (1) to prevent shipments from the manufacturer direct to the consumer; (2) to confine the shipments of

manufacturers to wholesalers and of wholesalers to retailers; (3) to confine the trade of the retailer to his legitimate territory.

C. PATENTS[41]

Several manufacturers of harrows, under various United States patents, assigned to the National Harrow Co. the patents severally owned by them, together with good will, agreeing among other things not to be interested in the sale or manufacture of such harrows except as agents or licensees of said corporation. The National Harrow Co. issued licenses to the several manufacturers, subject to uniform terms and conditions; its licensees manufactured and sold at least 90 per cent of such harrows made in the United States. The licenses issued prohibited among other things the cutting of prices, and provided that the licensees should not sell other harrows than those authorized by the licenses.

D. THE DINNER PARTY[42]

Article XIII of the petition alleges that—

> Under the auspices of the Corporation, these interests [steel manufacturing], naturally competitive, but harmonized by this network of correlations [interlocking directorates], and overshadowed and dominated by the power of the Corporation arising from its pre-eminence in the business and the irresistible strength of its alliances, come together from time to time, find out the views of the Corporation in respect of prices and output, and all that hitherto was affected by pools and formal agreements, reach a common understanding and purpose, and proceed to carry them out. It is not here alleged that merely assembling and exchanging information and declaration of purpose amounts to an agreement or combination in restraint of trade. These meetings and their results have gone further. What they actually accomplish shows the great and dangerous power achieved by the Corporation through unlawful combination exercised over the trade and commerce of the country. The concerted action taken has prevented fluctuations in prices and competition.

The petition further alleges that fully 90 per cent of the iron and steel trade of the United States was represented at the meetings referred to; that these meetings brought about the maintenance of

[41] Adapted from United States Bureau of Corporations, *Trust Laws and Unfair Competition*, 1915, pp. 115–17.

[42] From the *Statement of the Case between the United States of America and the United States Steel Corporation and Others in the District Court of the United States for the District of New Jersey*, pp. 311–13.

prices, and accomplished more than did the old pools and agreements which were frequently broken.

E. TRADE ASSOCIATIONS[43]

The remarkable growth of trade associations makes this form of co-operation of especial importance in the consideration of legislation against restraint of trade and unfair competition. A trade association is an efficient means by which those engaged independently in a particular line of trade may redress wrongs and improve conditions through collective action. It is capable of symbolizing the highest ideals in trade, or of expressing that which invites the odium of public censure and legal penalty. Directed within legal limits and along proper lines, it may accomplish much good, but, if ostensibly formed for a legitimate purpose, when in reality designed to accomplish illegal or questionable ends, it will result in much harm.

As employed in this chapter the term "trade associations" comprises associations of manufacturers, dealers (wholesale or retail), and producers of raw materials, such as mining companies and agricultural enterprises, in so far as their activities relate to the promotion of the commercial aspects of the business. Occasionally a mixed association includes both manufacturers and dealers in the same industry or in related industries.

Associations may be further classed into local, state, and interstate or national. The few associations which are international in their scope are here classed with interstate and national associations.

In actual practice, the advancement of the general welfare of the industry has been interpreted to cover a wide field of activities, from promoting the widest use of the product to "safeguarding legitimate profit" in various ways. The following is a partial list of their activities:

1. Publicity of product—co-operative advertising.
2. Price control.
3. Fixing the channels of trade; opposition to "direct selling"; the "irregular" dealer.
4. Uniform terms.
5. Marketing and other co-operative associations.

[43] Adapted from United States Bureau of Corporations, *Trust Laws and Unfair Competition*, 1915, pp. 705–14.

6. Standardizing materials, processes, or products.
7. Standard cost accounting.
8. Improving processes or product; technical activities.
9. Credit bureaus.
10. Collection agencies.
11. Traffic matters.
12. Labor matters.
13. Employment bureaus and clearance cards
14. Apprenticeship and trade education.
15. Legislative activities.
16. Supplying insurance to members.
17. Foreign trade.
18. Publications.

7. DOES LARGE-SCALE PRODUCTION MEAN MONOPOLY?[44]

Attention may now be directed to the reasons for this belief in the tendency of large-scale production to pass over into monopoly, and to the criticisms which such views evoke from writers who deny the existence of such a tendency. In favor of this proposition three general lines of argument may be distinguished: (*a*) the contention that a consolidated enterprise possesses advantages over independent companies in producing and marketing its goods; (*b*) the claim that mere mass of capital confers powers of destructive warfare so great as to deter possible competitors from entering the field; (*c*) the belief that modern competition between large rival establishments, representing heavy investments of fixed capital, is injurious to the public, ruinous to the producers, and in its final outcome self-destructive.

First in this list is the contention that a consolidated concern is a more efficient agent of production and exchange. It is claimed that a combination can effect a saving in no less than twenty different directions; and the economy arising from such sources is declared to be great enough to give the trust a control over the market based solely upon superior efficiency, and to make competition "hopeless." We can discuss only some of the more important savings that trusts are believed to realize. Of the twenty specific economies that have been enumerated, we shall take no notice of five which may be considered

[44] Adapted by permission from C. J. Bullock, "Trust Literature: A Survey and a Criticism," *Quarterly Journal of Economics*, XV (1900–1901), 190–210.

either doubtful or of minor importance.[45] Six others will be relegated to a footnote, since it may be denied emphatically that they represent any substantial advantages which large independent companies cannot secure.[46] Three more may be set aside for incidental discussion,[47] in connection with the views of those who deny the tendency to monopoly. Of the remainder, three items relate to advantages in the manufacture and three to economies in the exchange of products.

With respect to advantages in the manufacture of products it is claimed that trusts, by filling orders from the nearest plant, can effect a great saving in cross-freights. When the monopolized product is of a bulky sort, the industry is already localized pretty thoroughly before combination takes place; and, since most of the former independent establishments were producing chiefly for their natural local constituencies, the trust can save little in cross-freights. When, however, the product is light, transportation charges become a matter of small moment. In either case the room for saving in cross-freights is

[45] These alleged advantages are: (1) combinations will prevent adulteration and improve products; (2) they will reduce losses from unwise extension of credits; (3) they will not suffer from stoppage of work by accidents in any one locality, or by labor troubles; (4) they need to carry smaller stocks of goods to meet demands of the market; (5) they may eliminate needless middlemen.

[46] These six items illustrate the necessity of discriminating sharply between large-scale production and monopoly. (1) It is said that combinations can specialize the machinery of the separate plants, thus saving the loss resulting from changing from one kind of work to another. But large independent concerns have often done the same thing. (2) Combinations can push trade in foreign markets. But large independent companies have been equally successful, or almost so. This claim provokes a smile from a Minneapolis miller. Such concerns as the Baldwin Locomotive Company deny that combination is necessary for this purpose. Rivals of the Standard Oil Company are now following the trust into European markets. The Industrial Commission concluded that foreign trade does not need a monopoly. (3) Trusts can conduct auxiliary or subsidiary industries. So do many independent enterprises. (4) Trusts utilize by-products. So do large independent establishments, while small establishments sometimes co-operate for this purpose. (5) Trusts can employ chemists, inventors, and other experts to improve methods. For years this has been done by many large companies not in combinations. (6) Trusts can insure their own plants. But independent concerns may co-operate in establishing factory insurance companies, and secure the lowest possible rates, as some of our textile trades have done.

[47] These three advantages are: (1) combinations can specialize skill in management; (2) they can compare methods and costs of production in different plants (3) fixed charges decrease as the size of the enterprise increases.

not nearly as large as has been represented, while often it does not exist.

Then it is urged that a trust can draw upon all the patented devices of the constituent companies, and employ only those that are most efficient. But advantages accruing from this fact will in most cases prove to be of a temporary nature, as trusts that have tried to base a monopoly upon the control of all available patents have learned in the past and will learn in the future. Moreover a simple reform in our patent laws will make the best processes available for all producers at any time that the public finds such a measure to be necessary for protection against monopoly. Here then we find no natural law working resistlessly toward combinations, but a man-made device which can be regulated as public policy may dictate.

Again, we are told that a trust can produce more cheaply than separate concerns, because all the plants utilized can be run at their full capacity; whereas, under competition, many establishments can be kept in operation but a part of the time. Two observations may be made concerning this claim. First, the extent of the economies thus realized is grossly exaggerated. In general, it may be denied that, whenever governmental interference has not produced unhealthy and abnormal conditions, competition has led to such absurdly excessive investments as is commonly assumed. We must concede, however, that under normal conditions some reduction can be made in the number of plants required to supply the market at ordinary times; but this does not dispose of the matter. If a trust is to be prepared for supplying the market promptly in times of rapidly increasing demand, it is necessary that some surplus productive capacity must exist in periods of stationary or decreasing demand.

The last three economies relate to advantages in buying materials or selling products. It is urged that a combination can purchase its raw materials more cheaply than separate concerns. This would probably be interesting news to many large companies not connected with trusts, and Professor Ely is undoubtedly right in remarking that all ability in bargaining is not controlled by combinations.

And finally we come to economies in advertising and in soliciting business, where the wastes of competition are certainly serious and the room for improvement correspondingly great. Those who deny

the tendency to monopoly generally admit that a trust can have a material advantage here, while those who affirm the existence of such a tendency evidently realize that their case is strongest at this point. Yet an opportunity for saving in these departments does not always exist, and the extent of the economy is easily exaggerated in other cases.

The result of our discussion up to this point would seem to be that any advantages of a monopoly over independent concerns of a large size are but slight, except in the single matter of effecting sales. We must also take into account certain counteracting forces, upon which some writers rest their belief that competition will ultimately prevail.

The second argument advanced to prove the tendency to monopoly is the claim that mere mass of capital confers such powers of destructive warfare as to deter possible competitors from entering the industry, at least until prices have long been held above the competitive rate. It is said that a large combination can lower prices below the cost of production in any locality where a small rival concern is established, thus driving it out of the field. If on the other hand a large rival company attempts to compete in all markets, this will mean an investment of capital in excess of the needs of trade, with a consequent depression of business and loss to all concerned. Without doubt the destructive competition waged by combinations is an important consideration, and it may well enough reinforce monopoly where other attendant circumstances favor consolidation. But a monopoly based solely upon this power would be, confessedly, a temporary affair; for probably no one would claim that all capitalists would be intimidated permanently by such circumstances. This argument therefore may be used properly enough to strengthen the conclusions drawn from the alleged economies in production; but it does not of itself establish the existence of a permanent tendency to monopoly.

It should not be forgotten, furthermore, that this argument depends upon the fact that combinations at present are allowed to employ the weapons of discriminating prices and other tactics, which violate everyone's sense of fair play although they may be difficult to suppress.

The final reason for the belief that combinations must ultimately prevail is found in the character of modern competition in those industries which require heavy investments of fixed capital. Under such conditions the difficulty of withdrawing specialized investments and the losses that are entailed by a suspension of production make competition so intense that prices may be forced far below a profitable level without decreasing the output; and industrial depression inevitably follows. For such constant fluctuations in prices, combination is considered the natural and inevitable remedy. Some writers allege, furthermore, that it "is not possible to have competition without competitors, and, if there be competitors, one must prevail," so that monopoly "is the inevitable fruit of competition."

Competition cannot be proved a failure until it is given a trial. The evils from which many economists would seek refuge in industrial combinations are greatly increased by unwise laws which have now outlived any usefulness that originally they may have possessed. If unhealthful conditions produced by our own interference with the course of business are ever removed, competition will probably develop no evils which could not be borne, as vastly preferable to monopoly, public or private. Indeed, even as things are, the shortcomings of the competitive system are exaggerated; and attempted monopoly is more likely in the end to increase, rather than mitigate, those periodic fluctuations from which industry suffers.

8. THE EVILS OF THE SITUATION

A. THE EVILS OF MONOPOLY[48]

Setting to work according to the method of observation, we will first seek accurately to understand the evils which constitute the problem. If one were to jot down the various evils retailed in newspapers, magazines, and reports to legislatures, a somewhat confused list similar to the following one would be the result:

1. Exorbitant prices.
2. Bribery of the employees of competitors.
3. Abuse of patents.
4. Secret control of so-called competitors.

[48] Taken by permission from L. H. Haney, *Business Organization and Combination*, pp. 366–69. (The Macmillan Co., 1914.)

5. Price discriminations.
6. Discriminations in granting credit.
7. Preventing purchasers from dealing with competitors.
8. Factors' agreements.
9. Monopoly of natural resources.
10. Retarded progress through monopoly.
11. Poor service.
12. Waste and extravagance.
13. Overcapitalization.
14. Buying plants to shut them down.
15. Overgrown corporations.
16. Fraudulent promotion.
17. Excessive promoters' and underwriters' profits.
18. Inadequate financial statements.
19. Inadequate reserves.
20. Interlocking directorates.
21. Manipulation, or "inside" management.
22. "Melon cutting."
23. Abuse of proxies.
24. Abuse of minority stockholders.
25. Abuse of employees.
26. Hostility toward corporations.
27. Uncertainty as to the meaning of "reasonable restraint of trade."
28. Inability to co-operate.
29. Political corruption.

A cursory inspection of this sinister list leads one to see that it contains some overlapping and duplication, and to surmise that a little analysis might lead to a classification which would bring out the underlying causes.

In the first place, it becomes evident that this long list of evils all centers in four or five main points. Thus, all the abuses which lead to the terrorism or destruction of competitors by wrongful means tend to establish, or at least to make possible, high prices through monopoly. All those which lead to waste and uneconomical production tend toward higher costs and prices, and toward poorer service. Those evils, however, which, like promotion abuses, manipulation by directors, and abuse of minority stockholdings, mean a clash of interests within corporations and a loss to investors, do not directly mean monopoly or higher prices to consumers. Other evil centers in the labor problem, or in politics. These last evils will not be discussed in these

pages, the one group being rather indirectly and remotely connected with business organization; the other being non-economic. We can therefore group all the evils mentioned under six heads:

I. High prices (1–9, 10–17, 20, 28, etc.)	The consuming public
1. Monopoly control (1–9, 20)	
2. Uneconomical production (10–15, 26–28, 3, 4, 9, 16, 19)	
II. Inefficient service (10–15)	
III. Abuse of investors (12–24)	Security-holders
IV. Abuse of employees (25)	Laborers
V. Uncertainty among business men (26–28)	Business men
VI. Political corruption (29)	The state

One can hardly go this far in the analysis of particular evils without noticing that it points to the existence of two separate but interrelated problems: one the problem of combination organization and its relation to the public, the other the problem of simple corporate organization and its relation to corporation members. To the author it seems that this distinction is a point of capital importance. In these days we hear too much of the "trust problem" and too little of the *corporation problem*. The former is the problem of monopoly, and involves broad questions of economic policy. The evils which come under it are economic conditions and can be remedied only by modifying economic forces. It touches the masses of consumers very directly. The corporation problem, on the other hand, concerns the form of business organization, and is largely concerned with legal institutions. Its evils are attributable to corporations as such, regardless of combination or monopoly; and they can be remedied only by altering corporation law. They concern the investing class most obviously. But the corporation problem is no mere investors' problem.

B. THE DANGERS OF THE GOOD BIG-BUSINESS[49]

It is sometimes asserted that the mere size of a corporation should not affect its standing before the law, or its rights and obligations. In the sense in which this assertion is probably intended, it is correct; but if it is intended to imply that a corporation requires no more legal control when it is large than when it is small, it is untrue. The larger

[49] Taken by permission from T. N. Carver, *Essays in Social Justice*, pp. 329–32. (Harvard University Press, 1915.)

the corporation, the greater is its power, either for good or for evil, and that makes it especially important that its power be under control.

If I may use a homely illustration, I will take the common house cat, whose diminutive size makes her a safe inmate of our household in spite of her playful disposition and her liking for animal food. If, without the slightest change of character or disposition, she were suddenly enlarged to the dimensions of a tiger, we should at least want her to be muzzled and to have her claws trimmed, whereas if she were to assume the dimensions of a mastodon, I doubt if any of us would want to live in the same house with her. And it would be useless to argue that her nature had not changed, that she was just as amiable as ever, and no more carnivorous than she always had been. Nor would it convince us to be told that her productivity had greatly increased and that she could now catch more mice in a minute than she formerly could in a week. We should be afraid lest, in a playful mood, she might set a paw upon us, to the detriment of our epidermis, or that in her large-scale mouse-catching she might not always discriminate between us and mice.

9. SOME LINES OF REMEDIAL ACTION

A. CONTROL THROUGH ETHICAL DEVELOPMENT[50]

In industrial relations, in those things which people regard as matters of business, the community relies on self-interest to take the place of self-government. Of course, we do not carry this pursuit of self-interest to a point where it would violate our code of personal morality. We do not tolerate the ordinary and commonplace forms of lying and cheating. We do not use our commercial power to oppress individuals whom we know. We do not commit serious breaches of trust where the interests of some specific person have been placed in our charge. Commercial society would not tolerate any of these things; and even if it did, our own instincts of personal morality would prevent us from doing them. But when the personal relation does not come so prominently into the foreground; when the people who are injured by our conduct are not certain definite persons whom we see, but an unknown and indefinite body which we do not see; when we lay our plans to de-

[50] Adapted by permission from A. T. Hadley, *Freedom and Responsibility*, pp 155–61. (Charles Scribner's Sons, 1903. Author's copyright.)

ceive, not some specific individual or group of individuals, but large sections of the public; when the trust which we are exercising and which we have it in our power to break is not in the name of some specific ward, but on behalf of a general body of stockholders or bondholders—then our standards are much less satisfactory.

The commercial public has seen so much good arising from competition that it has come to rely upon this as a means of checking the evil effects of individual selfishness, and to regard it as far more powerful and universal than it really is. It has come to consider business as a game, to be played by each man in his own interest, subject to certain well defined rules or conventions of business life, but involving no special obligations outside of those rules. The public has assumed that if each man played this game fairly, with a view to securing all he could for himself, the general interests of industry and commerce would be well subserved.

We are, I think, beginning to be dissatisfied with this view of commercial ethics; and I regard this growing dissatisfaction as one of the most fortunate signs of the times. We are beginning to recognize that it is not enough to insist that the game of business should be played fairly, or to modify the ethics of that play by personal sentiment in those cases where we see the individual injury done, and in those alone. We are recognizing that business is something more than a game which each man can play to win. In its modern shape commercial business for all its leaders represents a trust.

If men of character, business sense, and clear-headed ethics can insist upon the duty of rendering continuous service to the public at reasonable rates, and by methods which prevent disastrous fluctuations in the value of securities, and regard wealth which is made by sacrifice of these standards as prima facie evidence of moral weakness rather than of industrial power, the problem will be solved. I believe that there is no other way to its solution, and that in the present temper of the American people and the present power of public opinion, there is a very strong hope of making progress toward a solution on the lines here suggested.

B. PROPOSED CORPORATION REFORM[61]

1. *Enact a national corporation law.*—President Taft recommended such a law under the advice of his Attorney-General. I have been contending for such a law for the past ten years and have never doubted its constitutionality. Most of the important corporations except banks and local utilities could be reached by it, as being engaged in foreign or interstate commerce as now understood. Whether the result be accomplished by direct national incorporation or through the indirect method of federal license and control is immaterial as compared with the inestimable advantages of either method over the prevailing lawless situation which constitutes a reproach to our institutions.

Substantial progress might also be made through the agency of the stock exchanges by placing them under the supervision of the federal government as is now the law of every European country. The New York Stock Exchange is the great security market of the world. Its far-reaching power over the business and finances of the country is not understood. It is essentially a public agency international in its scope.

Among the other urgent corporate reforms there may be mentioned: a uniform law for corporations engaged in foreign and interstate commerce on the general lines of the "British Companies Acts," which requires, among its other drastic provisions, (1) that the organizers fully disclose and deposit at the public office designated for the purpose all contracts showing the profits of bankers, brokers, promoters, underwriters, and middlemen under severe criminal penalties for violating these requirements; (2) that the stock be publicly offered and fairly allotted among the subscribers before it can be listed or dealt in on the stock exchange; (3) that the books be audited by independent public chartered accountants, who must prepare and send to the stockholders annually in advance of the annual meeting a statement of the accounts for the year. These accountants must be elected annually by the stockholders. They cannot hold over. (4) The directors must make full disclosure to the stockholders of the business of the corporation and must attend the annual meeting to an-

[61] Adapted by permission from an address delivered by Samuel Untermyer at a meeting of the Commercial Law League, July 27, 1916, pp. 11–26.

swer such questions as may be put to them. The compensation payable to them is voted by the shareholders, and under the English customs they cannot gamble in the securities of the company to which they hold a trust relation that is regarded as sacred everywhere save with us.

There is no such thing in England or on the Continent, under their laws, as a director making money out of his corporation directly or indirectly, whilst with us it is the rule rather than the exception and nothing is thought of the vicious practice. They have no banking houses that name the directors, control the policies, buy from the companies the securities thus controlled at prices fixed by themselves, sell them at a profit to themselves and act as fiscal agents by putting the funds into their own bank accounts on their own terms and then solemnly pass resolutions ratifying all they have done. A director who did the things there that are tolerated with us would be disgraced and drummed out of the community.

2. *The entire procedure affecting insolvency and the reorganization of insolvent corporations must be revolutionized and reversed.*—

a) A national incorporation law is the first necessary step in the process of simplification of the procedure.

b) The court proceedings for the appointment of receivers should be instituted by the Interstate Commerce Commission, somewhat after the fashion in which the Comptroller of the Currency appoints receivers for insolvent banks. The inauguration of that method of dealing with national banks and in the several states in which the bank superintendent acts for state banks and the superintendent of insurance for insolvent insurance corporations resulted in minimizing the expenses and in expediting the closing out of insolvent companies in their respective jurisdictions.

c) Notice of the application for receivers should be given by publication or otherwise to all securityholders, with the opportunity to them to be heard as to the necessity for the receivership and the personnel of the receivers.

d) The plan of reorganization should be subject to the approval of the Interstate Commerce Commission and of the court in the case of railway companies and to the Trade Commission and the court where industrial corporations are concerned. If it is just, it should be

put into effect upon the approval of three-fourths of each class of securityholders. If it is oppressive, any securityholder should be able to defeat it.

e) The farce of selling a property of this character should be abolished. Upon the approval of the plan by the court the new or reorganized company should take the place of the old company. Every securityholder would be bound by the plan and the securities of the new company would stand pledged and liable to sale for the payment of such assessment as the court may deem necessary to rehabilitate the property.

f) All the expenses of reorganization, as well as the amount and character of new securities to be issued, should be subject to the approval of the Commission. The entire procedure should be under its control, subject to review by the courts.

3. *Representation and protection of minority stockholders.*—It is manifestly right that the majority should control, but it is fundamentally wrong that the minority should have no representation in corporate management and no opportunity to inform itself of the way in which the majority is administering its trust. Compulsory cumulative voting, which means proportional representation of the board of directors, should be a condition of every corporate charter. Some of the states require cumulative voting by their constitutions.

4. *The existing methods of electing directors should be abolished and an entirely new system substituted,* by (1) requiring the board of directors to nominate its candidates before the election and to advise the stockholders of such nominations; (2) abolishing proxy voting; (3) permitting stockholders to vote by mail as well as in person, but not by proxy; and (4) prohibiting anyone other than the true owner from voting the shares.

In great corporations where the stock is widely scattered the control is frequently retained for a decade or more by interests that have little or no financial stake in the corporation except to exploit it for their own gain, and it has been found well-nigh impossible to dislodge them in the face of their demonstrated unfitness. This is especially true with respect to railroad corporations and great interstate industrial combinations. It is due partly to the secrecy that is tolerated in corporate affairs and the difficulty experienced by stockholders in dis-

covering what is being done with their property. It is, however, mainly due to the antiquated election machinery, the absence of minority representation, and the vice of proxy voting.

The limited voting device.[52]—Other countries have gone far to keep control of the banks out of the hands of large stockholders. Their laws render it impossible for such holders to dominate the corporation, even though they constitute the vast majority in ownership. Their effort is to force the control into the hands of the greatest *number* of small scattered holders as against the majority of stock interest in the hands of the smaller number of holders.

The following table on this point is illuminating:

Name of Bank	Limitation
Bank of England	Each stockholder owning £500 stock or more has but one vote, regardless of the amount of his holding
Union of London and Smith's Bank (England)	No corporation can hold stock. No transfer can be made except with consent of directors, who would refuse consent to transfer on part of anyone to get too large holding. Each 10 shares up to 200 has 1 vote, but no holder, regardless of amount owned, has over 20 votes
London and Westminster Bank (England)	Holder of 10 to 49 shares has 1 vote; of 50 to 99 shares, 2 votes; of 100 to 199 shares, 3 votes; of 200 shares, or over, 4 votes
Union Bank of Scotland	1 vote for 10 shares; 2 votes for 50 shares; 3 votes for 100 shares; and 1 vote for every 100 shares over 100
Bank of Scotland	1 vote for every £250 (5 shares) but not more than 20 votes, regardless of amount owned
Commercial Bank of Scotland	5 shares give 1 vote; 10 shares, 2 votes; 15 shares, 3 votes; 20 shares, 4 votes; 25 shares, 5 votes; 35 shares, 6 votes; 45 shares, 7 votes; 55 shares, 8 votes; 65 shares, 9 votes; 80 shares, 10 votes; 95 shares, 11 votes; 110 shares, 12 votes; 130 shares, 13 votes; 150 shares, 14 votes; 175 shares, 15 votes; 200 shares, 16 votes, which is the maximum vote
National Bank of Belgium	10 shares give 1 vote. No one can have more than 5 votes as shareholder and 5 votes as attorney for others whatever may be the number of his principals
Bank of the Netherlands	1 vote for 5 shares and 1 vote for each additional 10 shares
Russian banking law	No shareholder shall have a voting power exceeding one-tenth of the aggregate number of votes of members present at general stockholders' meetings

[52] From the *Report of the Committee to Investigate the Concentration of Control of Money and Credit,* February 28, 1913, pp. 143–44.

C. THE SHERMAN ANTI-TRUST ACT (1890)[53]

1. Every contract, combination in the form of trust or otherwise, or conspiracy, in restraint of trade or commerce among the several states, or with foreign nations [includes territories and District of Columbia.—ED.], is hereby declared to be illegal. Every person who shall make any such contract, or engage in any such combination or conspiracy, shall be deemed guilty of a misdemeanor, and, on conviction thereof, shall be punished by fine not exceeding five thousand dollars, or by imprisonment not exceeding one year, or by both said punishments, in the discretion of the court.

2. Every person who shall monopolize, or attempt to monopolize, or combine or conspire with any other person or persons to monopolize, any part of the trade or commerce among the several states, or with foreign nations, shall be deemed guilty of a misdemeanor, and, on conviction thereof, shall be punished by fine not exceeding five thousand dollars, or by imprisonment not exceeding one year, or by both said punishments, in the discretion of the court.

. . . .

8. That the word "person" or "persons," wherever used in this act, shall be deemed to include corporations and associations existing under or authorized by the laws of either the United States, the laws of any of the territories, the laws of any state, or the laws of any foreign country.

D. PROVISIONS OF THE FEDERAL TRADE COMMISSION ACT (1914)[54]

This act creates a Federal Trade Commission of five members, appointed by the President with the consent of the Senate. The members serve for a term of seven years with an annual salary of $10,000. The Commission succeeds to the work of the Bureau of Corporations.

Unfair methods of competition in commerce (what constitutes "unfair methods of competition," not being defined in the act, is left for the Commission to determine) are declared unlawful and the Commission is to prevent persons, partnerships, or corporations (except banks and common carriers, which are otherwise controlled) from using such methods. Where such methods are in use and the Commis-

[53] From 26 U.S. Statutes 209.

[54] Taken by permission from a statement prepared by C. W. Wright.

sion deems it to the interest of the public to have them stopped, the Commission must hold a hearing, and if it then considers the methods employed illegal under this act it shall order the practice stopped. The party subject to the order may appeal from it to the United States Circuit Court of Appeals, and the Commission, in case its order is not obeyed, may appeal to the court to enforce its order. The findings of the Commission, if supported by testimony, are conclusive in the court. The court may affirm, modify, or set aside the order of the Commission.

The Commission has the power: (*a*) to gather information about, and investigate the business of, those subject to this act; (*b*) to require special and annual reports of such corporations; (*c*) to investigate, and on request of the Attorney-General they must investigate, the way in which court decrees against the violation of the federal anti-trust laws are being carried out; (*d*) on the direction of the President or either House of Congress to investigate and report the facts as to any alleged violation of the anti-trust laws; (*e*) on application of the Attorney-General to investigate and recommend readjustments in the business of any corporation alleged to be violating those laws; (*f*) to make public such information, except trade secrets and names of customers, as it may deem expedient in the public interest, and to submit reports and recommendations for legislation to Congress; (*g*) to classify corporations and make rules to carry out this act; (*h*) to investigate trade conditions in and with foreign countries where combinations, practices, or other conditions may affect our foreign trade, and to report thereon to Congress with any recommendation.

Power is given the Commission to summon witnesses to testify, secure records, etc.

E. PROVISIONS OF THE CLAYTON ANTI-TRUST ACT (1914)[55]

The term "omnibus bill," frequently applied to the Clayton act, well indicates its character as covering a wide range of more or less related topics. For the sake of greater clearness concerning its significant features, only the chief provisions are stated here, though

[55] Taken by permission from a statement prepared by C. W. Wright.

nothing but a detailed study of the phraseology of the act itself can give an accurate conception of its provisions.

In the main the act attempts to deal with two things: (1) it seeks to check certain undesirable practices found among industrial combinations, railroads, and banking institutions; (2) it seeks to give labor organizations greater freedom from prosecution under the anti-trust laws and in proceedings connected with injunctions.

In connection with the first purpose the law forbids: (*a*) discriminations in prices between purchasers where the effect may be substantially to lessen competition or create monopoly, though differences in price due to variations in quantity, quality, cost of selling, or transportation, etc., are permitted; (*b*) "tying clauses" where commodities, patented or unpatented, are leased or sold, or a price is fixed or discount or rebate given, on condition that the lessee or purchaser shall not use or deal in the goods of a competitor and where the effect of such an understanding is substantially to lessen competition or tend to create a monopoly in any line of commerce; (*c*) the holding of the stock of one corporation by another where the effect may be substantially to lessen competition or tend to create a monopoly (but this does not apply to the cases of certain subsidiaries, or to branch lines or extensions of railroads, or to stock purchases solely as an investment where there is no such tendency, or to such rights heretofore legally acquired); (*d*) after two years, any person serving as a director, officer, or employee of more than one bank where one of them is organized under the laws of the United States and either has deposits, capital, surplus, and undivided profits of over $5,000,000; or any person serving as an officer, director, or employee of more than one bank in any place of over 200,000 inhabitants where either bank is organized under the laws of the United States; or serving as a director in more than one concern engaged in commerce (other than banking institutions and common carriers) any one of which has capital, surplus, and undivided profits over $1,000,000 if such concerns are or have been competitors so that an elimination of their competition would constitute a violation of the anti-trust laws.

In the case of railroads, contracts or purchases of goods to the amount of over $50,000 in any one year from other concerns, when the president, manager, purchasing officer, or agent of the railroad is

in any way interested in such concern, shall not be made except through free competitive bids under rules determined by the Interstate Commerce Commission.

Any person injured in his business by anything forbidden in the anti-trust laws can sue in the federal courts and recover treble damages. A violation of any of the penal provisions of the anti-trust laws by a corporation shall also be deemed a violation by the officers authorizing the act and deemed a misdemeanor subject to fine or imprisonment.

The prohibitions enumerated above are to be enforced, where applicable to common carriers, by the Interstate Commerce Commission; where applicable to banking institutions, by the Federal Reserve Board; where applicable to concerns otherwise engaged in commerce, by the Federal Trade Commission. Whenever there is reason to believe that any of these prohibitions are being violated the respective board or commission shall serve a complaint on the offending person or concern and hold a hearing, and if it shall then appear that the law is being violated an order shall be issued, or, in case the order is not obeyed, the respective board or commission may appeal to the United States Circuit Court of Appeals, which, upon a hearing, may affirm, modify, or set aside the order.

In the second group of provisions, which included those dealing with labor organizations and their practices, the law first declares that the labor of a human being is not a commodity or an article of commerce and that nothing in the anti-trust laws shall be construed to forbid the existence and operation of labor, agricultural, or horticultural organizations, or to restrain them from lawfully carrying out their objects, nor shall such organizations be construed to be illegal combinations under the anti-trust laws.

The law somewhat modifies the issue, and the method of issuing and enforcing injunctions in labor disputes, prohibiting their use unless necessary to prevent irreparable injury to property rights for which there is no adequate remedy at law. Also injunctions shall not be issued against striking and peaceful picketing or boycotting by peaceful and lawful means, and such acts shall not be held to be a violation of any law of the United States. In cases of contempt of court arising under this act the accused may demand a trial by jury, except

in suits prosecuted by the United States or in cases of contempt in or near the presence of the court.

C. Recent Trends in Production and Productivity

By now it should be a commonplace that our modern economy is dynamic, and in particular that it is characterized by continual changes in methods of production and in the kinds and amount of goods produced. The vast rearrangements of society in the nineteenth century—the so-called Industrial Revolution—resulted in an enormous expansion of the output of goods. This expansion has by no means reached its close. On the contrary, the opening quarter of the twentieth century has seen such a tremendous forward surge in productivity that some writers are now speaking of a "new" industrial revolution.

Our best measurements indicate that in the United States during the first twenty-five years of this century the total physical output of farms, factories, mines, and railroads more than doubled. Apparently the production of many goods and services which are not included in the output of farms, factories, mines, and railroads (such as building construction, merchandising, health preservation, teaching, and amusing) also increased at a great rate. As an example, the amount of elementary and secondary-school instruction per person was estimated to have increased 85 per cent from 1890 to 1924. As another example, there was an increase in the expectation of life from 48 years in 1901 to 58 years in 1925.

What has caused this recent great increase in productivity? Clearly the increased productivity has resulted from many types of change in the organization and methods of production and an account of these changes would virtually be a social history of our times. We may be sure that these changes all fall under the great conditioning factors of production in terms of which Part II has been organized: the natural background of production; the cultural background of production, both physical and non-physical; the personal element in production, both labor and management.

It will be accepted as a matter of course that the fact of increased productivity in and of itself is by no means a sufficient justification of any economic order. But it is highly important.

These issues[55a] may well be kept in mind while reading the following selections.

1. In quantitative terms, what seems to be a reasonable expectation of the rate of increase of productivity of our society?
2. What are the outstanding explanations or reasons for our large productivity?
3. What seem to be the outstanding trends in our productivity?
4. Granted rapidly increasing productivity, what are some of the other outstanding desiderata of production in the modern order?

1. THE RECENT INCREASED EFFICIENCY OF AMERICAN INDUSTRY[56]

During the first quarter of the Twentieth Century striking changes have occurred in American industry. The more important characteristics of these developments are mass production, the integration of industrial operation into large enterprises, increasing mechanization of production, the rise of new industries, and the widespread everyday use of products which a generation ago were unknown or considered as luxuries. Output per person engaged in production has increased, and per capita income has likewise grown, permitting the people of the nation to purchase the additional products which the improved efficiency of industry has enabled them to produce. The causes of these changes are many and varied and the consequences are of considerable significance from the standpoint of social and economic progress.

From 1899 to 1919 the physical volume of production of farms, factories, mines, and railroads in the United States increased by 140 per cent, while population grew by only a little over 50 per cent. Thus production per capita of population is now nearly 60 per cent greater than it was in the final years of the Nineteenth Century. This estimate does not cover construction activities of various sorts, or development of facilities for communication or for recreation. It is probable that omitted phases of human endeavor—particularly those relating to recreation—have grown even more rapidly than those cov-

[55a] A more detailed statement of issues may be found in *Outlines of the Economic Order*, pp. 220–30. (The University of Chicago Press.)

[56] Adapted from Woodlief Thomas, "The Economic Significance of the Increased Efficiency of American Industry," *American Economic Review*, XVIII, No. 1, Supplement (March, 1928), pp. 122–38.

ered, so that the estimate quoted is likely an understatement of the increase in physical volume of production.

The volume of output for each worker engaged directly in production has increased since the beginning of the century at an even more rapid rate than that of production per capita of population. Output per person engaged in production has increased by 80 per cent as compared with 60 per cent of gain per capita of population.

Increases in physical volume of production and number of workers, from 1899 to 1925, for four major branches of industry—agriculture, mining, manufacture, and railway transportation—are shown in Chart I.

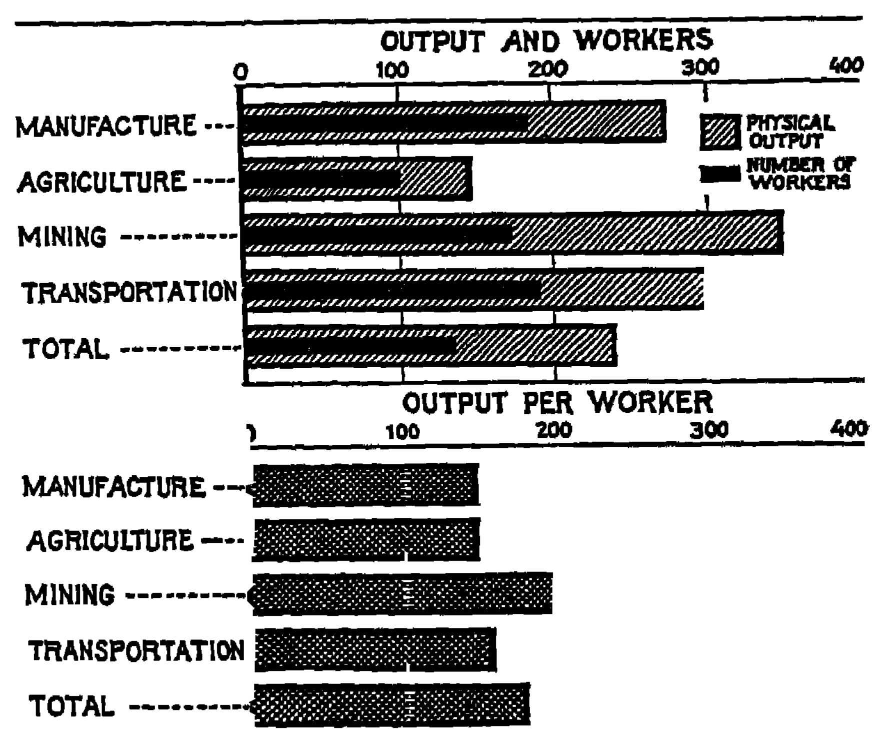


Chart I

Growth in Production per Worker, 1899–1925
(Index numbers for 1925 with 1899 equaling 100)

Estimates of growth are at best broad approximations and are intended only to convey some general impression of the changes that are taking place in industry. There were increases in these four branches of industry in the first twenty-six years of this century of 139 per cent in the quantity of goods produced and traffic carried, of 34 per cent in the number of workers engaged, and of 78 per cent in the output per worker. The increase in output per worker was 20 per cent in the first decade of this period, 15 per cent in the second decade, and 29 per cent in the last six years.

The growth in the production of minerals and in output per worker—far exceeding that of any of the other branches—reflects chiefly the rapid increase in petroleum output. The process of producing petroleum requires a relatively small supply of labor, and therefore output of minerals per person has increased rapidly.

In case of agriculture, satisfactory comparable data as to number of workers are not available but after careful consideration of all pertinent data, Dr. Durand estimated that between 1899 and 1925 there

had been no appreciable change in number of persons engaged in agricultural production. Output, in the meantime, and therefore approximate output per person, increased by 47 per cent. Exactly the same growth in output per person is shown for manufactures. From 1899 to 1919 there was a much larger growth in output per worker in agriculture than in manufacturing, reflecting important improvements made in the technology of agricultural production, particularly during the second decade of the century, while manufacturing in 1919 was considerably disturbed by postwar readjustments.

Growth of railroad transportation is shown by the large increases in number of employees of railroads and in volume of traffic. These

TABLE I

GROWTH OF MANUFACTURES, BY CENSUS YEARS, 1899–1925

(Index numbers, 1899 = 100)

	Quantity of Output	Number of Persons Engaged	Output per Worker	Primary Horse-power Installed
1899	100	100	100	100
1904	122	117	104	134
1909	159	145	110	185
1914	169	156	108	222
1919	214	204	104	292
1921	170	158	107	....
1923	261	197	132	330
1925	275	187	147	356
1927 (estimated)	280–3	182–6	151–5	....

increases were especially large in the first decade of the century, but slackened somewhat in the second decade, and between 1919 and 1925 there was a decrease in number of employees and practically no change in volume of traffic. The growth in traffic volume per worker has continued throughout the period, giving a total increase of 56 per cent, slightly exceeding the increases for agriculture and manufacturing. It has been estimated that in the same period there was an increase of 100 per cent in traffic units per man-hour. Phenomenal improvements have been made in railroad efficiency during recent years by means of unified planning and routing of freight cars, expansion of locomotive tractive power, economies in fuel consumption, and other methods.

Figures for manufactures show a steady expansion in manufacture from 1899 to 1925, with some retardation in 1914, a year of mod-

erate depression, and a sharp drop in 1921, a year of extreme depression. The growth in quantity of manufactures produced during this period was at the rate of 4 per cent a year, applying alike to the decade from 1899 to 1909 and to the period following from 1909 to 1925.

All of the factors in American industrial progress are interrelated. Our natural resources, physical magnitude, and large population provide a broad market and the sources of an abundant capital supply. These permit the development of machine production on a large scale, characterized by the repetitive manufacture of standardized articles in establishments scientifically managed from the standpoint of output at lowest possible cost. Expanding educational and research facilities have contributed to improve technology in production, administration, and salesmanship.

Many of these elements in our industrial progress, however, are not forces which have only recently become effective. We have had natural resources, internal free trade, and a fairly wide domestic market during most of our industrial history; we had them, certainly, in the period from 1909 to 1921, when productivity per person in manufacturing failed to gain. The phenomenal increase in manufacturing efficiency has apparently come since 1921. It is worth while to consider the forces that have caused this recent sudden spurt.

In the first place, the apparent changes are due partly to faults in our statistics. The years 1914, 1919, and 1921 are not typical; there was probably some increase during that period which would be shown were data available for intervening years. Then the war considerably disturbed industrial technique and delayed progress for a period, but at the same time new technological processes and methods were learned as a result of war experiences, and what is perhaps of equal value, the importance of co-operation and of having adequate and accurate knowledge of developments was impressed upon the business community. During the war, furthermore, plant capacities were increased considerably, in most cases with modern equipment. As a result, complaints are still heard of the excess capacity of industry—overcapitalization in a physical sense although perhaps not in a financial sense because much of the cost of installation was charged off during and immediately after the war. The cumulative effect of these factors—and of others such as the increased literacy of the popula-

tion, expansion in available information, prohibition, and curtailed immigration during the war—was further delayed by the industrial depression of 1921. During this depression, however, plants were reorganized, excess capitalization reduced, inventories diminished, inefficient workmen discharged, and costs of operation lowered. Thus was inaugurated the recent pronounced movement toward increasing productivity, and the cumulative force of all of the factors working toward that end became at once effective. Immigration restrictions and prohibition, which became operative about that time, may also have been factors.

Abundance of investment funds at reasonable rates was also an important contributing element. This made it easy to purchase machinery, to expand plants, where necessary, to substitute new and more economical equipment for obsolete or obsolescent equipment, and to experiment with new processes and products. I venture the assertion that one of the most important factors in the growth of American industry, particularly in the past five years, but also in earlier periods, has been the boldness exhibited by the American business man in scrapping old equipment and methods and trying new ones, and the ease with which he has been able to obtain funds to finance these operations.

One of the most significant influences in increasing the productivity of industry as a whole has been the shifting importance of the individual industries that make up the industrial structure. This development is seen in the rise of new industries which rely chiefly upon the machine process or which make products that contribute to the saving of time and labor, and the decadence of old industries that are inefficient as measured by output per worker or ability to enlarge output per worker. The growth of these new industries thus causes a larger expansion in the total output of industry than in the number of workers employed, and contributes to the increasing output per worker of industry as a whole.

The rise of the petroleum industry is an excellent example of such a development. Other examples of similar shifts are seen in the substitution of cement for brick, stone, and lumber in building construction and of baker's bread for the homemade product, and in the growth of the automobile industry and of those other industries which

contribute to the increasing use of mechanical contrivances in all phases of our lives.

Analysis of the growth of manufactures reveals certain significant features of the industrial progress of the past quarter century, which indicate far-reaching changes in methods of production and habits of consumption.

(1) The most striking increases shown have occurred in those industries manufacturing goods which are devoted to recreation and diversion or which have brought about radical changes in manners of living—in many cases so-called luxury goods, that have become, in fact, necessities. Familiar examples, in which percentages of increase run into four or five figures, are the automobile and its related products—gasoline and tires—phonographs, photographic equipment and supplies (including moving pictures), silk goods, confectionery, ice cream, cigarettes, and, in recent years, rayon and radios.

(2) The second group of industries showing outstanding increases are those making so-called producers' goods—industrial machinery and equipment, manufactured fuels, and materials for further production. Examples are iron and steel, nonferrous metals, machinery, petroleum refining, and by-product coke. The expansion of these industries reflects the increasing mechanization of production which has taken place in nearly all industries and which has been such an important factor in improving productivity.

(3) A set of industries which have expanded rapidly are those that provide labor-saving devices for office and home as well as for the factory—electrical appliances, typewriters, calculating machines, cash registers, heating apparatus, and, to some extent, automobiles as well. These are something of a cross between the two groups mentioned in that they are producers' goods which have contributed to changes in living habits and in some cases are also considered as luxuries.

(4) The substitution of newly discovered or developed products for old ones has resulted in some important changes in industrial arrangements, in the rapid expansion of new industries and the decadence of old, formerly well-established industries. Some examples of such industrial conflicts are cement, metals, and tile vs. brick and lumber in building construction; paper boxes vs. wooden boxes for

packing and shipping; by-product coke vs. beehive coke; automobiles vs. carriages, wagons, and bicycles, and cigarettes vs. cigars. In most cases these new products can either be produced more efficiently or in their utilization are more economical of time or labor.

(5) Production of staple articles of consumption has shown little increase beyond that needed to care for the growth of population. An appreciable increase in consumption of the staples of food and clothing is not to be expected—in fact it is undoubtedly true that the clothing requirements for women, measured in bulk per capita, have diminished considerably during the last quarter century. The production of flour per capita has apparently decreased since the beginning of the century and the output of leather and products has about kept pace with the increase in population.

(6) The character of goods consumed and the methods of producing consumers' goods have changed, however, for in a number of cases production has been transferred from the home to the factory and the output of certain manufactured consumption goods has increased. Outstanding examples are manufactured dairy products, canning and preserving, and the manufacture of millinery goods.

(7) As a consequence of these changes, during the past quarter of a century, industry has become less dependent upon farms and forests as sources for raw materials, while the use of minerals has increased. Witness the growth of industries in the metals and chemicals groups as contrasted with those in the food, textile, leather, and lumber groups. The reasons for this change, as previously indicated, lie chiefly in the growing mechanization of industry and in the relatively static character of the demand for staple products of food and clothing, which are largely derived from agricultural materials.

This, in brief, is what has taken place in industry. Certain industries have grown; others have failed to grow beyond the rate of population expansion, while production of industry as a whole has increased at a far more rapid rate than population. This growth in production per capita has meant increased purchasing power for the consumer which has been used not to buy an additional amount of staple articles of food and clothing but has been expended upon new products and services of various sorts, chiefly those which provide recreation and diversion, which supply labor- and time-saving devices, or

which for some reason are, in the opinion of the consumer, more beautiful or more serviceable.

It is impossible in so brief a paper adequately to discuss or even to suggest all the consequences of this Twentieth Century industrial revolution. I have not discussed, for example, the effect upon wages. The picture as I have presented it appears on the whole to be a bright one. There are other social and economic consequences which might be considered favorable—the extra amount of leisure permitted by increased output per person, the opportunity to enjoy a more diversified existence, the longer time permitted to be spent on education, as evidenced by the rapid increase of students in our schools and colleges, the lessening of the drudgery of the housewife, the proposal and partial inauguration of a five-day work week, and so one might continue to enumerate such results.

On the other hand, a multitude of problems of a social and economic nature are presented by these changes—localities dependent upon an industry suffer as a result of the decline of that industry in competition with new products; in the struggle of producers to profit from the expanding consumer's market, vast sums are wasted in competitive advertising of almost identical products; it is held by some that too much of the increased purchasing power and leisure gained by the people of the nation is spent upon buying and using automobiles, radios, movies, silk stockings, cosmetics, bootleg liquor, and sensational journals, and not enough upon adequate homes, wholesome food, healthful outings and recreation, and good drama and literature.

What shall be done about the excess of workers on the farms? On the other hand, there are a whole set of new social and economic problems which have already been raised by the rapid growth of our cities. With increasing mechanization, it is claimed that the task of the worker has become depressingly monotonous. Will the increase in purchasing power and leisure which may be granted him offset this disadvantage? What will be the effect of standardization of consumption upon the artistic values of consumers? There are also questions in connection with the effect of changes in production upon prosperity and depression. In the complex industrial system which has grown up can consumers' desires be forecasted—or controlled—so as to avoid serious maladjustments in the type and quantity of goods pro-

duced? Will further increases in productivity permit the continuation of declining industrial prices? Or have falling prices and competition so far narrowed margins of profit that the position of many business establishments is becoming precarious?

On the whole we have profited by the increasing productivity of our industry, but prosperity should not prevent us from recognizing that each step in the march of progress brings us face to face with new problems whose solution will require all the knowledge we can muster and all the wisdom we possess.

2. INCREASE IN PRODUCTIVITY MEASURED IN INCOME FIGURES[57]

The total "current income" of the American people rose from $62,736,000,000 in 1921 to the record breaking total of $89,682,000,000 in 1926, according to preliminary estimates. Although the national income has increased 40 per cent since 1921, this growth is not

TOTAL CURRENT INCOME OF PEOPLE OF UNITED STATES

Year	Current Dollars (Millions)	1913 Dollars (Millions)	Year	Current Dollars (Millions)	1913 Dollars (Millions)
1909	27,100	28,200	1919	67,254	37,600
1910	28,400	29,100	1920	74,158	36,300
1911	29,000	29,300	1921	62,736	36,200
1912	30,600	30,800	1922	65,567*	40,400*
1913	32,000	32,000	1923	76,769*	46,900*
1914	31,600	31,300	1924	79,365*	48,400*
1915	32,700	32,000	1925	86,461*	51,100*
1916	39,200	35,500	1926	89,682*	52,900*
1917	48,500	37,300			
1918	56,000	35,500			

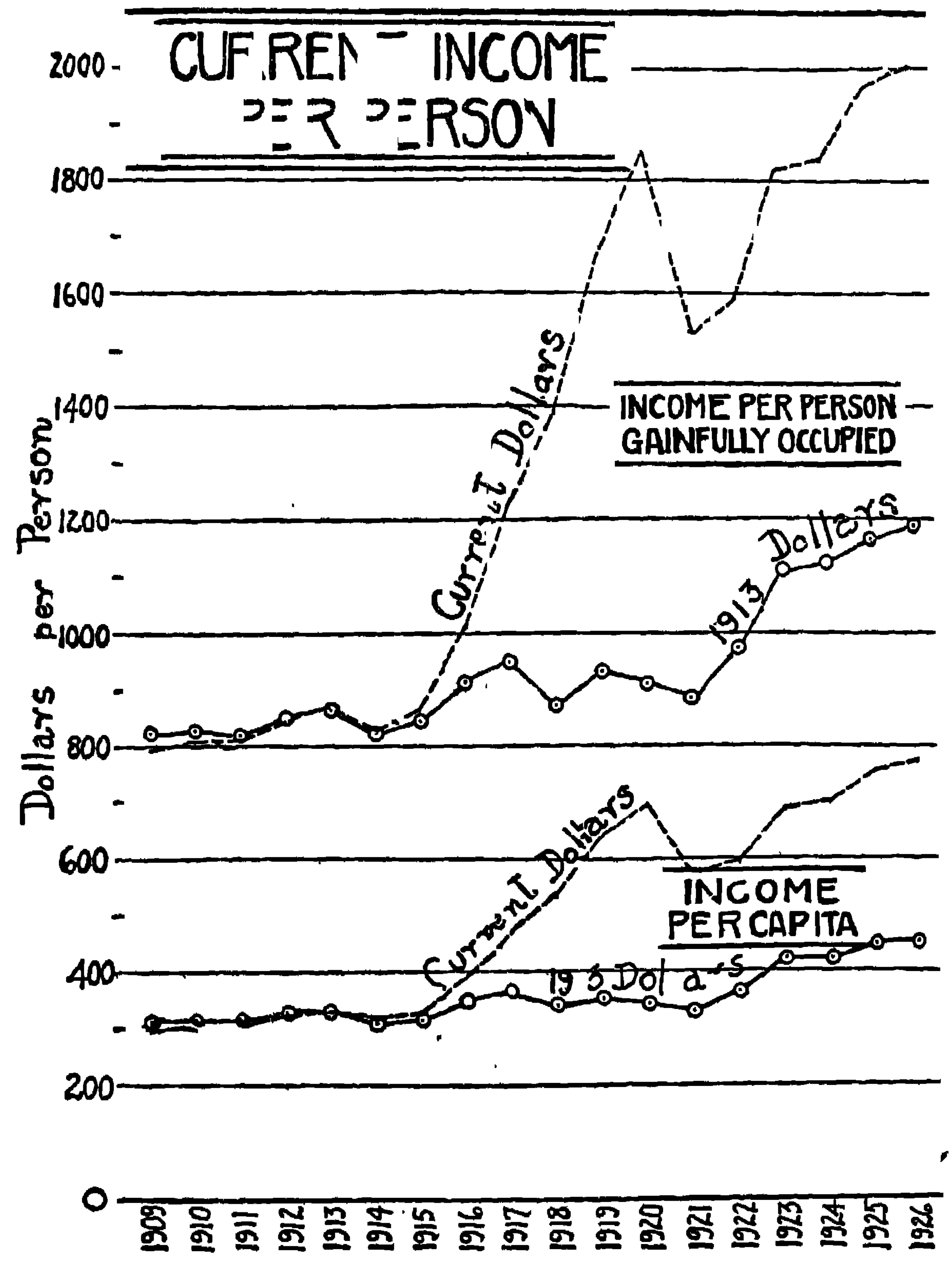
*Preliminary estimate.

merely a fictitious quantity resulting from an increase in the price level, for the average price of direct or consumption goods was actually slightly less in 1926 than in 1921.

The figures as here presented are for "current" income. "Current income may be defined as the excess of cash receipts over business expenses, plus the money value of income received in the form of commodities. It is estimated by summating (1) wages, salaries and

[57] Adapted from the National Bureau of Economic Research *News Bulletin*, February 21, 1927.

pensions, (2) profits withdrawn from business, (3) dividends, interest, and rent received by individuals, (4) the rental value of homes occupied by their owners, (5) interest upon the sums invested in household furnishings, clothing, and the like, and (6) the value of commodities which families produce for their own consumption."



PER CAPITA INCOME

The figures become much more significant when they are reduced to a per capita basis. It appears that, in 1926, the average inhabitant of the United States had an income of $770 or one-third more than in 1921. When this per capita income is expressed in dollars having the purchasing power which they possessed in 1913, we find that the increase has been about 36 per cent. It appears, then, that from the

economic point of view, the condition of the average inhabitant has been improving at a rate of about 7 per cent per annum.

The startling nature of this change is indicated by the fact that the annual increase since 1921 has been as great as the entire increase during the 12 years from 1909 to 1921. The fact should be noted, however, that the difference in slope is partially accounted for by the fact that 1921 was a year of depression, while 1926 has been one of unusual prosperity. A fairer comparison may be made by dividing the entire period into two parts—1909 to 1917, and 1917 to 1926.

During the first period of eight years the per capita income, in terms of 1913 dollars, increased 15 per cent, while during the last

ESTIMATED CURRENT INCOME PER CAPITA

Year	Current Dollars	1913 Dollars	Year	Current Dolllars	1913 Dollars
1909	$299	$312	1919	$640	$358
1910	307	315	1920	697	341
1911	309	312	1921	579	334
1912	321	323	1922	597*	369*
1913	329	329	1923	689*	421*
1914	320	316	1924	700*	426*
1915	326	319	1925	752*	445*
1916	385	349	1926	770*	455*
1917	470	361			
1918	537	340			

*Preliminary estimate

nine years it increased 26 per cent. If the preliminary estimates are correct, there has, then, been a sharp upward turn in the trend of economic welfare in the United States.

INCOME PER PERSON GAINFULLY OCCUPIED

In the United States, in 1926, there were some 44,600,000 of the inhabitants who belong in the category designated by the Bureau of the Census as gainfully occupied—that is, they were engaged in activities yielding them direct money incomes. Some of these were employers, many more were employees, and some were simply working on their own account. The figures exclude housewives and women and children helping the head of the family on the home farm.

For every person gainfully occupied in 1926, there appears to

have been an income of slightly over $2,000. When reduced to terms of 1913 purchasing power, we find that the average person working for a money income received about one-quarter more for his services than he obtained in 1917, and about 44 per cent more than he could have secured in 1909. The indications are, then, that despite the constantly growing population and the relatively inelastic nature of the supply of natural resources, new inventions and greater skill and

INCOME PER PERSON GAINFULLY OCCUPIED

Year	Current Dollars	1913 Dollars	Year	Current Dollars	1913 Dollars
1909	$ 791	$823	1919	$1669	$ 934
1910	809	829	1920	1851	907
1911	812	821	1921	1537	887
1912	844	850	1922	1586*	979*
1913	864	864	1923	1821*	1113*
1914	836	828	1924	1840*	1121*
1915	861	843	1925	1971*	1165*
1916	1014	919	1926	2010*	1186*
1917	1232	947			
1918	1386	879			

*Preliminary estimate.

organization are still enabling the average inhabitant to progress steadily upward on the scale of economic welfare.

3. INCREASED OUTPUT OF ONE NON-TANGIBLE PRODUCT[58]

Taking account both of the proportion of the children in school and of the average duration of attendance, the amount of elementary and secondary instruction given in 1924 was 154 per cent greater than in 1870, and 85 per cent greater than in 1890. In 1890 about 5½ per cent of the children between the ages of 14 and 17 years were in high school and academies; in 1924 over 33 per cent. Of persons 18 to 21 years of age about 1½ per cent were in colleges and universities in 1890, and more than 7½ per cent in 1924. Meantime instruction has become much better in quality and especially more practical and more conducive to thinking power and to productive capacity. The rapidly expanding scientific research in colleges and universities, in endowed research institutions and in laboratories of great industrial concerns, has also proved of great practical importance in the progress of industry.

4. SOME VARIATIONS IN PRODUCTIVITY[59]

Growth in output per person may be attributed to two sets of factors: The first relates to changes within individual industries and plants, and the second to shifts among industries composing the industrial structure as a whole. The first set of changes includes the

PROGRESS OF EDUCATION IN THE UNITED STATES

Item	1870	1890	1910	1920	1924
1. Pupils in elementary and secondary schools, per cent of total population for 5 to 17 yrs. of age	57.0	68.6	73.5	77.8	82.8
2. Average day's attendance in the year	78	86	113	121	132
3. Expenditure for elem. and second. schools per person 5 to 17 yrs. of age	$5	$7	$24	$37	$62
4. Average annual salary of teachers in elem. and second. schools	$189	$252	$485	$871	$1,227
5. Pupils in high schools and academies, thousands	......	298	1,032	2,041	2,754
5a. Per cent of total population 14 to 17 yrs. of age	......	5.6	14.3	26.4	33.2
6. Pupils in collegiate, postgrad. professional courses, thousands	......	78	204	414	607
6a. Per cent of total population 18 to 21 yrs.	......	1.5	2.8	5.6	7.7
7. Receipts of institutions of higher learning, exclusive of additions to endowment, millions of dollars	......	......	78	189	341
8. Percentage of illiterates in population 10 yrs. of age and over:					
All classes	20.0	13.3	7.7	6.0	....
All whites	11.5	7.7	5.0	4.0	....
Native whites	......	6.2	3.0	2.0	....
Negro	81.4	57.1	30.4	22.9	....

increasing utilization of machinery and power, the introduction of various sorts of labor-saving devices and methods, the growth of mass production of standardized articles, the elimination of waste, the planning of production in relation to general business conditions, and other economies resulting from improvements in methods and management. The rapid increase in the rated horsepower of installed prime movers is an evidence of the growing utilization of machinery and power.

[58] "Education and Research," *Commerce Yearbook 1926*, I, 20.

[59] *Monthly Labor Review*, XXIV, No. 1 (January, 1927), 48–49, 37; and XXIV, No. 6 (June, 1927), 53.

For industry as a whole and for large groups of industries, however, a part of the increase in output per person is due to the shifting of production from industries dependent in a large degree upon labor to industries more susceptible of mechanization and of mass production. This is evidenced by the rise of such industries as the manufacture of motor vehicles and the producing and refining of petroleum, as well as the substitution of new products for old, as in the case of cement for lumber, brick, and stone; by-product coke for beehive coke; cigarettes for cigars; and baker's bread and factory-canned goods for the products of the housewife.

Although the effect of expressing changes in output per man-hour in the form of index numbers is to institute a comparison between the productivity increases or decreases in various industries, such comparisons must be carefully interpreted. In the boot and shoe industry, for example, the average output per man-hour does not appear to be any higher in 1925 than it was in 1904, while in the automobile industry the productivity increased nearly 600 per cent in the same period. This, however, must not be interpreted as a reflection on the management or the workers in the boot and shoe industry, for this is an old well-developed industry, which had already attained a high level of productivity in 1904, while the automobile industry was scarcely in existence and all the technique of mass production had not been invented. New industries, in which the technique of production has yet to be developed and in which there is a rapidly growing demand for the products, could hardly do otherwise than show remarkable increases in the productivity of labor in a comparatively short time. On the other hand, an old established industry with a settled demand and a developed technique could not very well achieve any such increase in productivity.

Again, as was mentioned above in the discussion of boots and shoes, the level attained by the best plants in an industry may be far above the general average for the industry as shown by the productivity figures in this study. This would be the case in an industry where there was a pronounced difference in the technique and practices of the better plants as compared with the less efficient ones, and this means an industry in which production has not been concentrated in the hands of comparatively few large companies. If there were

separate data on the total production and total man-hours in the better plants only as distinguished from the others, it would be possible to present two sets of productivity indexes, one for the industry in general and the other for the best practice in the industry. It may be asked why, in such a case, the better plants do not drive the smaller or weaker ones out of the market. There are various reasons: (1) development of styles and novelties, as in boots and shoes; (2) a small

INDEXES OF PRODUCTIVITY PER WORKER IN ELEVEN INDUSTRIES
(1914=100)

Year	Iron and Steel			Boots and Shoes	Leather Tanning	Slaughtering and Meat Packing	Petroleum Refining	Paper and Pulp	Cement Manufacturing	Automobiles	Rubber Tires	Flour Milling	Cane Sugar Refining
	Industry as a Whole	Blast Furnaces	Steel Works and Rolling Mills										
1899....	60	44	63	100	93	......	62	......	......	......	......	......	......
1904....	69	59	71	108	92	......	57	82	......	40	......	94	......
1909....	100	80	104	100	92	115	117	95	......	36	......	93	......
1914....	100	100	100	100	100	100	100	100	100	100	100	100	100
1915....	120	......	......	......	......	......	......	......	......	......	......	......	......
1916....	124	......	......	......	......	......	......	......	......	120	......	......	......
1917....	109	......	......	......	......	......	......	101	......	133	......	......	......
1918....	103	......	......	......	98	......	......	101	......	90*	......	......	......
1919....	100	96	101	105	101	93	92	104	103	136	130	96	79
1920....	115	......	......	......	99	......	......	102	......	150	......	......	......
1921....	94	110	92	115	126	119	111	94	124	193	190	118	82
1922....	136	......	......	116	130	125	126	118	......	249	......	......	......
1923....	139	154	137	107	134	128	135	116	132	270	266	128	102
1924....	137	......	......	107	131	129	163	128	143	262	301	......	114
1925....	159	......	159†	106	126	127	183	134	161	272	311	140	128

* This figure is not representative of productivity in the automobile industry in 1918 because of the fact that the government, for war purposes, placed a restriction on the number of cars which could be produced. In addition, many manufacturers were extensively engaged in executing war orders.

† Estimated.

margin of profit, thus giving local plants a big advantage over centralized plants which have heavy expenses of transportation, evidenced by flour milling, cement manufacturing, and meat packing; (3) nature of raw material deposits, as in the case of cement, where the existence of easily accessible, rightly proportioned deposits might far outweigh any possible advantage of productivity of labor by one plant over another. Thus, it is possible that small firms will continue in such industries for years, not able to develop any great increase in productivity or reduction in costs, but nevertheless able to maintain their position in the industry.

5. TWO ERAS OF INCREASING PRODUCTIVITY COMPARED[60]

That we live in a "new era," in which the laws of economics are suspended, in which all financial records are broken, and in which an indefinite continuance of the breaking of financial records may be confidently looked forward to, is believed by a good many people. Many men whose financial education began in the quiet period that ran from 1908 to 1914, are a good deal puzzled by the developments of the past seven years. But veterans whose memories go back to the middle nineties, remember another "new era," not less remarkable in its financial demonstrations, and a good deal more impressive on the side of the production, transportation, and exchange of goods, running from 1896 to 1903, and continuing, after a violent setback, in security prices but not in business, in 1903, until the Panic of 1907. Few American bankers remember the still earlier "new era," running from 1877 to 1881, during which the average price of sixty active railway stocks advanced from a low of 20.58 to a high of 101.54—a high level, which, incidentally, was not reached again until 1901.

Even before 1877, there was more than one "new era" in American finance, but the records are scant and the lessons to be drawn from their study are, perhaps, of uncertain application to the present day. In the case of the "new era" of 1896–1903, however, the records are full enough, and the analogies are close enough, to make it distinctly profitable to compare it with our own "new era." There are highly important resemblances and some significant differences. If the study does nothing else, it will at least convince us that economic laws are not suspended, and that like causes generate like results.

In the matter of physical volume of production, the old "new era" substantially outstripped the new "new era," though the two are fairly comparable in their behavior, the increase in the earlier period being 43 per cent, and that in the later "new era" being 35 per cent.

Measured in dollars, rather than in physical volume, however, the percentage increase in production was far greater in the earlier "new era" because prices at wholesale rose rapidly in the first period and have not risen at all in the second period. The underlying value-

[60] Adapted from B. M. Anderson, "Two 'New Eras' Compared: 1896–1903 and 1921–1928," *Chase Economic Bulletin,* IX, No. 1 (February 11, 1929), 3–4, 12–14.

stream, namely production multiplied by prices, increased 83 per cent in the first "new era," and only 35 per cent in the second.

The indices of production used in the foregoing computations include no element of transportation. They are based on manufac-

PHYSICAL AND PECUNIARY VOLUME OF PRODUCTION
1896–1903

	Index of Physical Volume of Production. Average for 1894–96 = 100	Index of Wholesale Prices 1896 = 100	Pecuniary Volume of Production-Underlying Value-Stream
1894 1895 1896	100	100	100
1897	121.3	100.1	121.4
1898	122.5	104.3	127.8
1899	121.0	112.3	135.9
1900	122.5	120.7	147.9
1901	125.3	118.9	149.0
1902	144.8	126.5	183.2
1903	143.1	128.2	183.5

PHYSICAL AND PECUNIARY VOLUME OF PRODUCTION
1919–1928

	Index of Physical Volume of Production. Average for 1919–1921 = 100	Index of Wholesale Prices 1921 = 100	Pecuniary Volume of Production-Underlying Value-Stream
1919 1920 1921	100	100	100
1922	109.8	99.1	108.8
1923	121.1	103.1	124.9
1924	119.3	100.5	119.9
1925	124.4	106.0	131.9
1926	128.8	102.5	132.0
1927	129.0	97.7	126.0
1928	134.6	100.1	134.7

turing, agriculture and mining. The figures in table on page 943 compare transportation in the two periods.

Had the index for transportation been included as an important element in the index of production, it would obviously have increased very greatly the difference in favor of the earlier period in the matter of the growth of physical volume of production, and consequently in the growth of pecuniary volume of production. Omitting the transportation figures has probably unduly minimized the difference be-

tween the two periods in these respects. But I wish to take cognizance of the fact that there has been, in recent years, a substantial diversion

TRANSPORTATION INDEX (AS CALCULATED BY WALTER STEWART) 1896 = 100

Year	
1896	100.0
1897	100.0
1898	137.1
1899	125.7
1900	142.9
1901	148.6
1902	162.9
1903	177.1

TRANSPORTATION INDEX 1921 = 100

Year	
1921	100.0
1922	109.3
1923	132.2
1924	125.3
1925	132.4
1926	139.9
1927	135.4
1928	135.3

of traffic from the railroads to automobiles and motor trucks, and to make a certain measure of allowance for unusual growth, in recent years, of certain activities which do not easily get into statistical records. The omission of transportation figures from our indices of production certainly does full justice to the present "new era" as compared with the old "new era" with respect to these points.

6. CAUSES OF OUR RECENT INCREASE IN PRODUCTIVITY[61]

The list which follows is an attempt to discover in the mass of changing phenomena the inventions and discoveries which are really formative. For not all changes involve movement forward. Some of them, in spite of the optimism of their inventors or supporters, may actually be retrogressive; some of them may simply be of no real account. What is wanted here is to put an inquiring finger on those suggestions which seem most likely to be assisting.

This is the list:

A. General Causes.

1. The spread of general and technical education in the United States.
2. The inheritance of and addition to the racial store of technical skills and knowledges.
3. Changes in the size and pattern of our population.
4. Progress toward the more complete division of labor and the consequent mechanization of industrial processes.

[61] From pp. 62–64 of *Industry's Coming of Age* (1927), by R. G. Tugwell. Reprinted by permission of the publishers, Harcourt, Brace & Co., Inc.

5. Reduction of stoppages of and interferences with industrial activity which we group under the name of "depression."
6. Our recent taking advantage of the possible productive contributions of women.
7. Better arrangement of our consuming lives which adds greatly to our productive power.
8. The development of combination and association among businesses.
9. The cumulative nature of "surplus," of which we have more than was possessed by any other economy.

B. Specific or Technical Causes.

1. The discovery and spread of "scientific management" and the elimination of rule-of-thumb.
2. Directed industrial research and controlled invention.
3. Standardization of many basic materials and processes.
4. The continuous process and the serialization of machines.
5. Improved layout, location and routing practice.
6. Careful pre-planning and enlarged reliance on paperwork.
7. Better general organization of the executive function and the development of the rule of exceptions.
8. Better accounting control which gives the executive more instant and accurate knowledge of the affairs for the direction of which he is responsible.
9. Better financial operation based on more complete and accurate budgetary control.
10. Increasing the scale of operations, which results in a large volume of output with low per-unit costs.
11. Development of the policy of taking a relatively low price for a large volume as contrasted with a high price for a small volume.
12. Reduced inventory burdens, achieved through quicker turnover, simplified marketing, and improved transport and communication.
13. Reduction of trade ignorance and secrecy, resulting in a more rapid spread of improved practices, machines and processes.
14. The increase of salvage operations and other ways of reducing wastes.
15. Improved communication and transport facilities, and better organized exchange markets.
16. Improved financial mechanisms.
17. The bringing into use of new and better power resources more suited to our technique, more flexible and less wasteful; and continued progress in the technique of generating and applying power.
18. American readiness to scrap obsolete plant and equipment.
19. Study of personnel; use of care in the processes of hiring, shifting and promoting. Introduction of fitness tests; and the rule of promotion by merit.
20. Reorganization of methods of wage payment to achieve fairness and a maximum wage-incentive. And the pressure of high wage-scales and re-

duced hours making necessary much study of ways to cut costs besides lowering wages or increasing hours of work.

21. The spread of various schemes for increasing the welfare of employees at work, and for increasing democracy in control.
22. The tendency of unions to organize on an industrial basis. And the interest of unions in better management as one way to raise wages.

See also:
"Scientific Research and Natural Resources," page 323.
"A Sketch of the Development of Science," page 348.
"Four Stages in the Development of the Use of Knowledge," page 354.
"The Engineering Profession," page 356.
"A General View of Modern Technology," page 480.
"The Significance of the Machine Tool," page 485.
"The Increase of Active Capital in the United States," page 493.
"The Productivity of Machinery," page 497.
"An Index of Energy Consumption," page 500.
"Power Developments in the United States," page 502.
"Formula for an Efficient Workman," page 593.
"Securing and Maintaining an Effective Working Force," page 655.
"Industrial Standardization," page 791.
"Simplified Practice," page 793.
"Impersonal Laws of Management," page 803.
"The New Industrial Leadership," page 812.
"Advantages Claimed for Large Scale Operations," page 880.

PRINTED IN U.S.A.